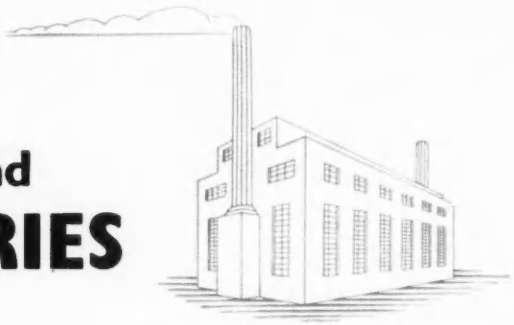
ELECTRICAL TIMES

THURSDAY
8 MARCH
1951
SIXPENCE

BICC

CABLES and ACCESSORIES were installed in 18 B.E.A. POWER STATIONS during 1950



- Bankside
- Birkenhead
- Brunswick Wharf
- Cliff Quay
- Croydon "B"
- Kingston
- Meaford
- Nechells
- North Tees
- North Wilford
- Ocker Hill
- Peterborough
- Portobello
- Staythorpe
- Thornhill
- Walsall
- Warrington
- Wigan (Westwood)

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

it sells itself . . .

It sells on appearance . . . it sells on cooking space . . . it sells on performance . . . and it is supported by selling advertising and selling literature. That is why the B.N.E. C.49 is in and out of the showroom so quickly.

Attractive selling aids available on request.

B.N.E. *Model C49*

BNE Product

BRITISH NATIONAL ELECTRICS LTD.

The Domestic Appliances Section of JOHNSON & PHILLIPS LTD.

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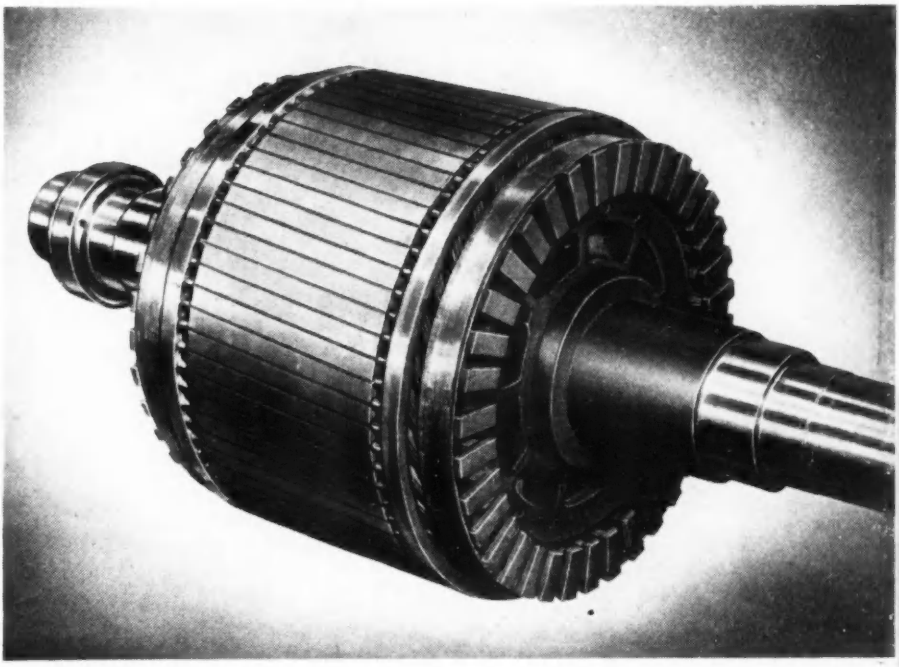

A typical 'Trislot' rotor of medium-large size

'TRISLOT'– magic word for starting torque

The L.S.E. 'Trislot' is a squirrel cage motor of special design, giving a higher starting torque for a lower starting current than a standard squirrel cage machine, combined with high running efficiency.

Suitable for all high torque applications and for use in many instances instead of the more expensive slip-ring installation.

One example of the comprehensive range of machines made by the specialists:

LAURENCE, SCOTT & ELECTROMOTORS LTD

NORWICH · MANCHESTER · LONDON & BRANCHES

A

Not only a high grade tubing at a competitive price but a great time-saver in conduit installation — "K" Aluminium Electrical Conduit Tubing. Easy to bend, to thread and to set. Quick to cut. Lighter to handle. Will not rust, meaning longer life for tubing and cable. Besides being a good thermal and electrical conductor it is non-magnetic and of attractive appearance.

Available in all the usual conduit sizes, in aluminium or—for extra strength—in aluminium alloy. Supplied with plain ends or screwed with couplings. Let us quote for your requirements.

Aluminium CONDUIT TUBING

E. & E. KAYE LTD.
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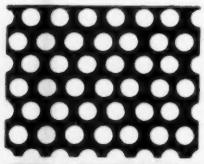
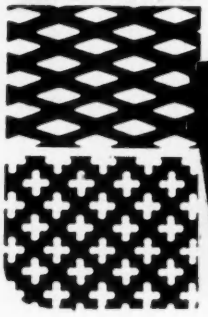
Telegrams.. Cuwire, Enfield

PERFORATED METAL . . .



for
Covers and Panels on Electrical Machinery, Equipment and Motors



ASH and LACY Ltd
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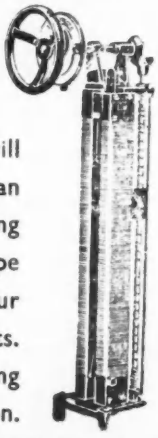
2515 B

SLIDING RESISTANCES
for all purposes



At a price you will approve, CRESSALL can supply you with a Sliding Resistance of the type and size to meet your particular requirements. Make a point of getting in touch with us soon.

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registered Trade Name of—
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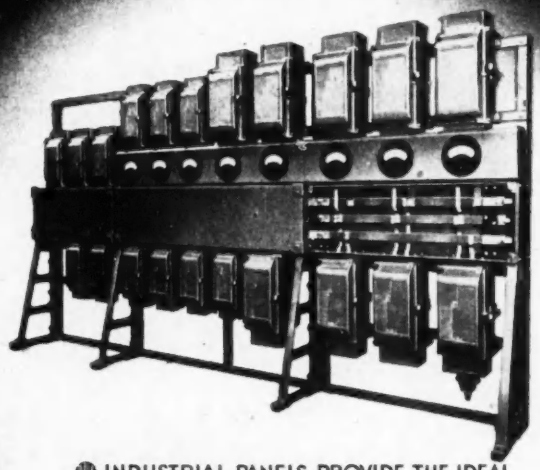

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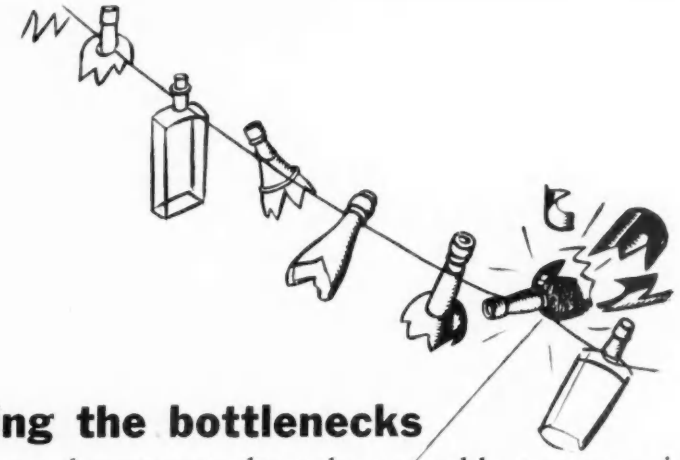

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Some of our departments have been unable to cope with the enormous demand for our fires and cookers and for the time being delays and shortages must occur. We are hoping to eliminate these bottlenecks and thereby increase our production.

Meanwhile you can be sure that we are doing everything possible to ensure a fair share of Belling fires and cookers to everyone.

You can't beat a "Belling"

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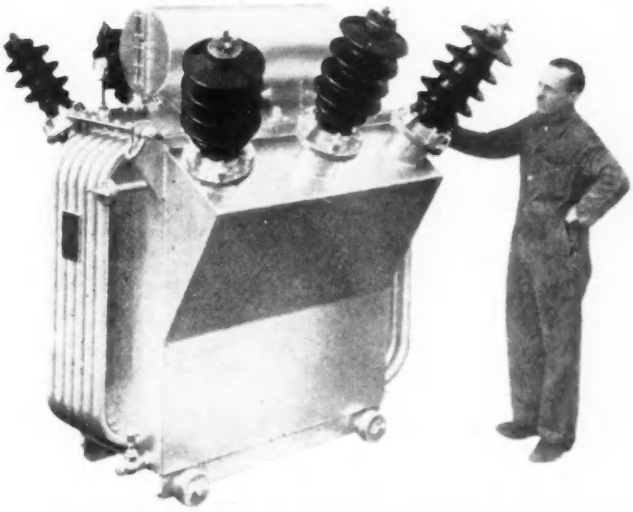
DENIS FERRANTI COMPANY LTD

— FORMERLY PEARSON ELECTRIC Co LTD —



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ROYTON, OLDHAM, LANCASHIRE TEL. MAIN 6651

RESISTANCE WIRE

Each wire has its purpose. Brightray wires are not for cages but for resistance heating.

Operating conditions in domestic and industrial heating appliances vary widely and the Brightray series of nickel-chromium and nickel-chromium-iron alloys have been developed to provide a grade which is the best for each purpose.

BRIGHTRAY C is for electric fires, cookers, etc. (maximum operating temperature 1,150° C.)

BRIGHTRAY S is for electric furnace elements (maximum operating temperature 1,150° C.)

"Brightray" is a registered trade mark.

BRIGHTRAY F is for electric furnace elements in special atmospheres only (maximum operating temperature 1,000° C.)

BRIGHTRAY B is for convectors, toasters, etc. (maximum operating temperature 950° C.)

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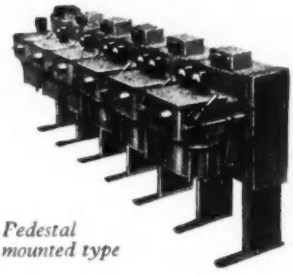
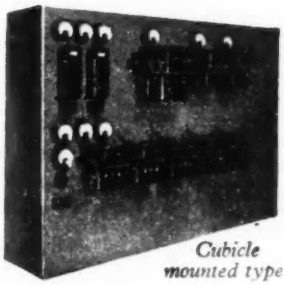


Pedestal mounted type



Cubicle mounted type

Increasing load on the electricity supply distribution system calls for the installation of industrial type switchgear of the utmost reliability.

The fully tested type 'K' range of switchgear, manufactured by 'Ferguson Pailin Ltd,' has been designed for use on systems up to 660 volts and for normal current ratings up to 1,600 amps. The unit is strongly constructed and has the great advantage of small dimensions for its capacity, so that it may be mounted in the place most convenient to the area where power is required. It may be pedestal or cubicle mounted and can be arranged for single unit or switchboard.

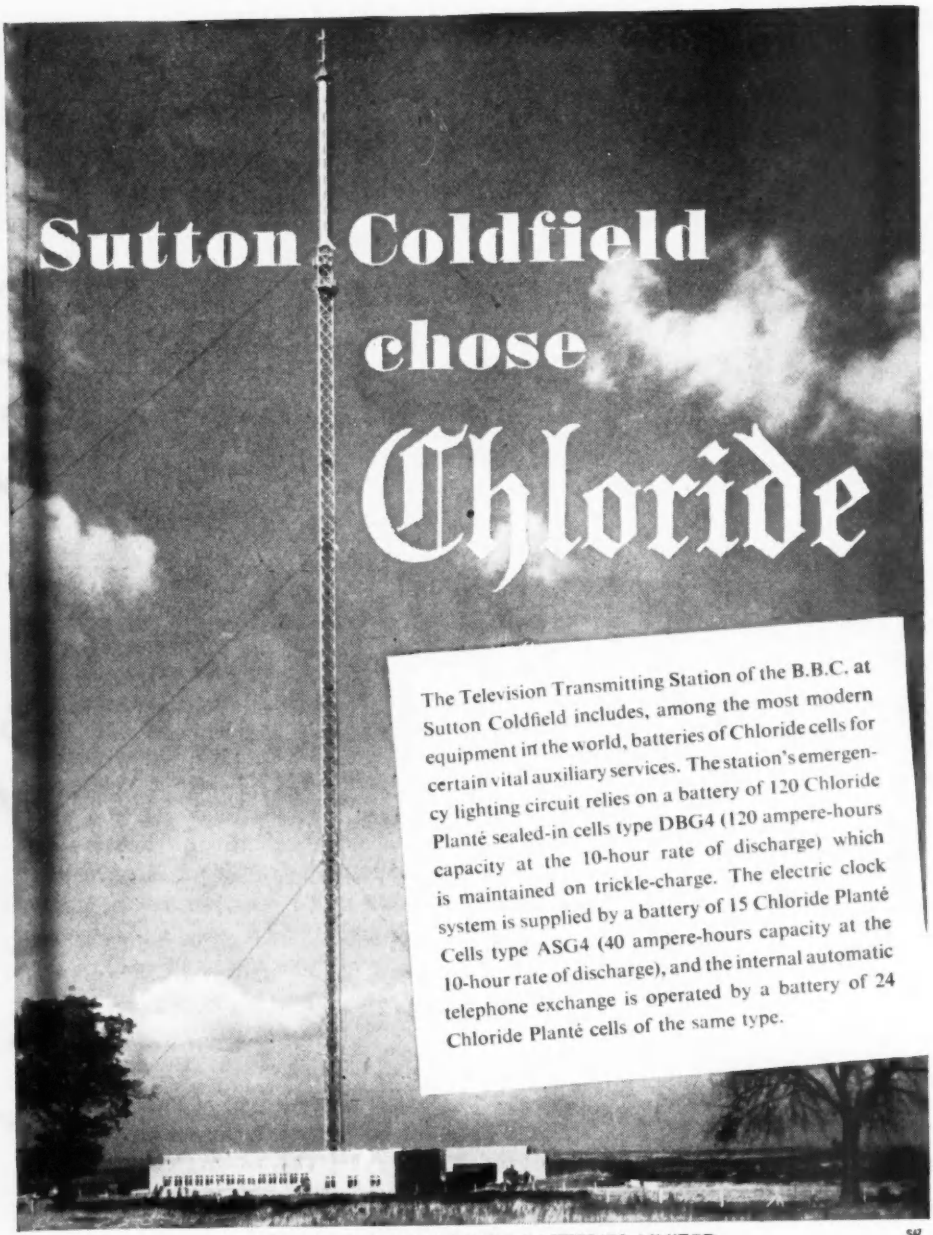
Full information on this type of Switchgear will be gladly sent on request to interested Executives or responsible officials.

FERGUSON PAILIN LTD.

MEMBER OF THE A.E.I. GROUP OF COMPANIES

Switchgear Specialists

MANCHESTER, 11. ENGLAND



The Television Transmitting Station of the B.B.C. at Sutton Coldfield includes, among the most modern equipment in the world, batteries of Chloride cells for certain vital auxiliary services. The station's emergency lighting circuit relies on a battery of 120 Chloride Planté sealed-in cells type DBG4 (120 ampere-hours capacity at the 10-hour rate of discharge) which is maintained on trickle-charge. The electric clock system is supplied by a battery of 15 Chloride Planté Cells type ASG4 (40 ampere-hours capacity at the 10-hour rate of discharge), and the internal automatic telephone exchange is operated by a battery of 24 Chloride Planté cells of the same type.

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This Electric Construction motor driving a booster at the Washwood Heath plant of the West Midland Gas Board (Birmingham District) is a 460 B.H.P. fully compensated D.C. machine with a speed range of 750/1750 R.P.M. It is pressure-ventilated from separate motor-driven fans.
The control gear for this motor and the rectifier which supplies it are of E.C.C. make.

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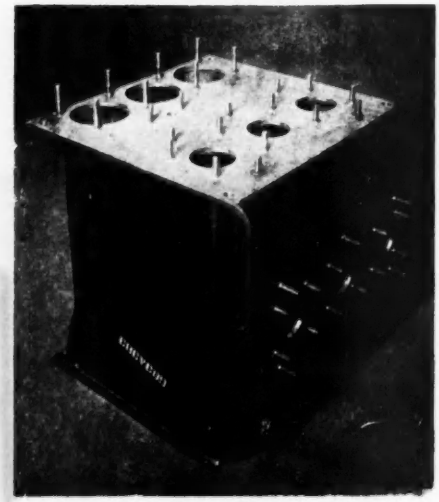

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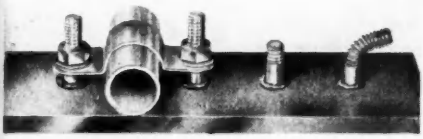

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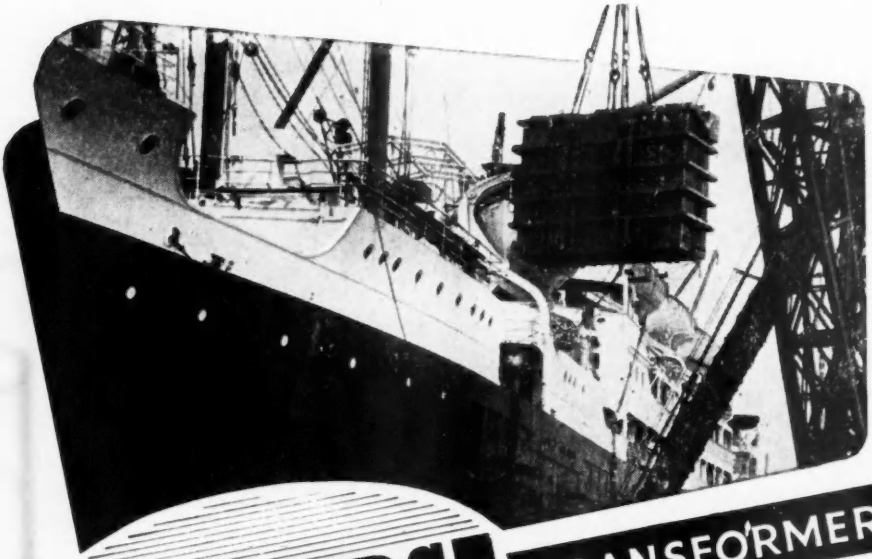

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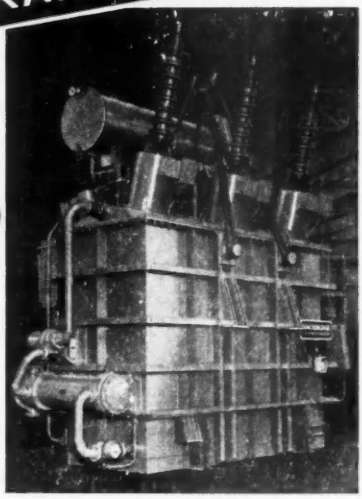
SOUND design and solid construction—inherent characteristics in Hackbridge transformers—ensure long and reliable service even under the most arduous conditions. That is why electrical engineers all over the world welcome the arrival of their Hackbridge transformers. They know that *quality* means *economy*, and experience tells—Hackbridge IS quality.



One of four 20 mVA 100/6.6 kV. type OFW Hackbridge transformers for the Tata Hydro Electric Power Supply Co.'s Parel Receiving Station, Bombay

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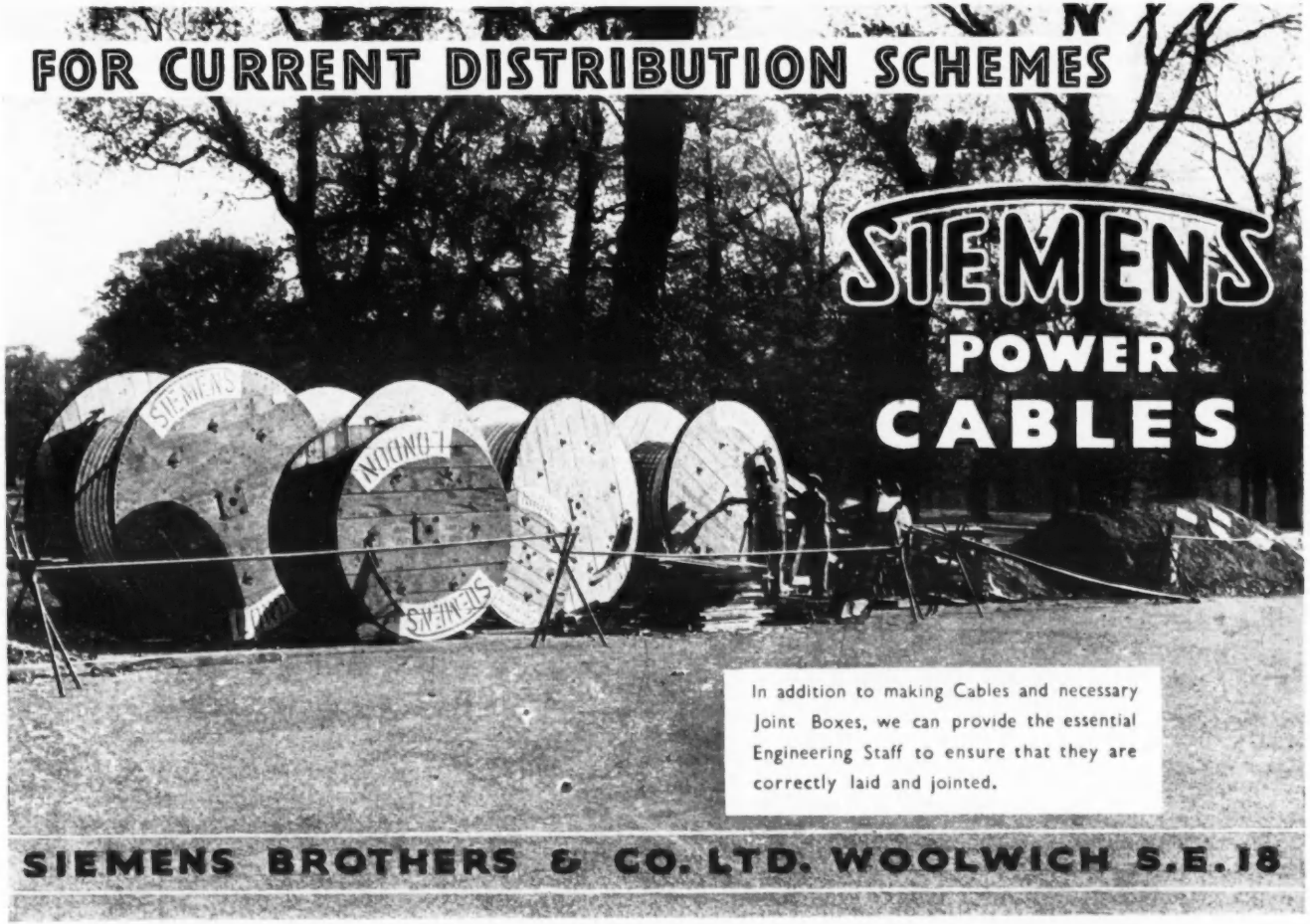
Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames


FOR CURRENT DISTRIBUTION SCHEMES
SIEMENS
POWER
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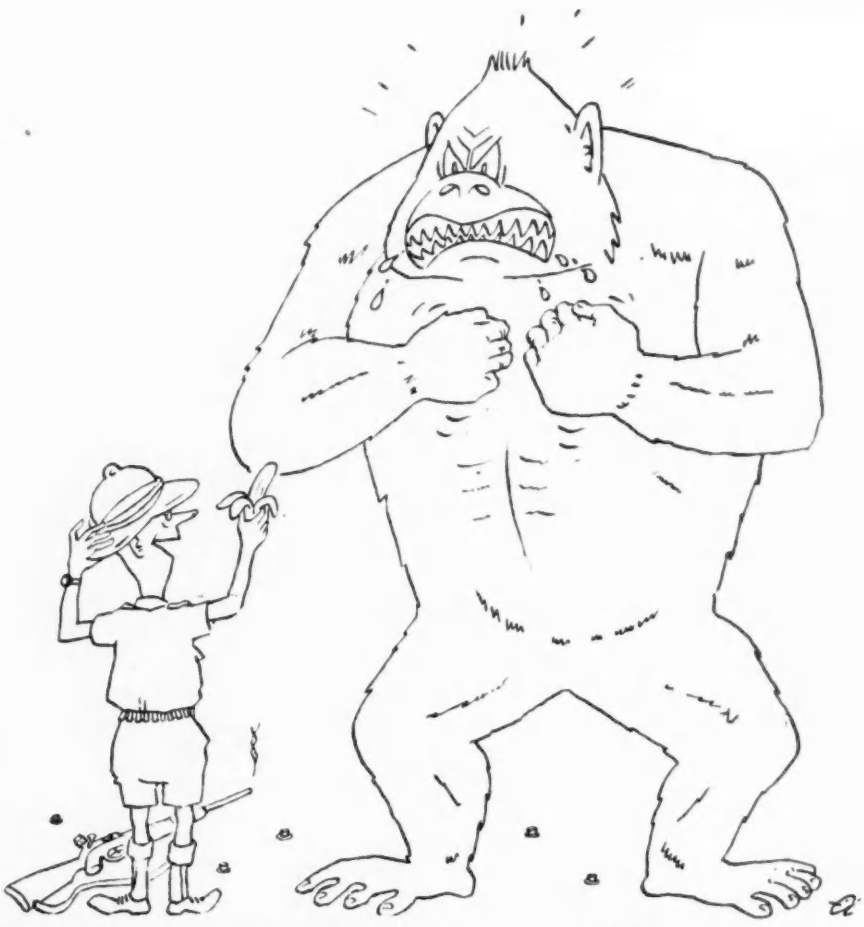
In addition to making Cables and necessary Joint Boxes, we can provide the essential Engineering Staff to ensure that they are correctly laid and jointed.
SIEMENS BROTHERS & CO. LTD. WOOLWICH S.E.18



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SALTER
for SAFETY

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It's always dangerous to 'monkey' with quality, and no manufacturer will take unnecessary risks with components: it is an axiom that one gets precisely what one pays for. In the long run it's far more costly to buy cheap parts, even though high quality parts cost more initially; and though SALTER Springs may be higher in price than some others, they are so merely because the emphasis is always on Quality. With this we take no risks, and feel sure your policy will be the same—to *both* of us UNNECESSARY risks are far too expensive.

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in every industry

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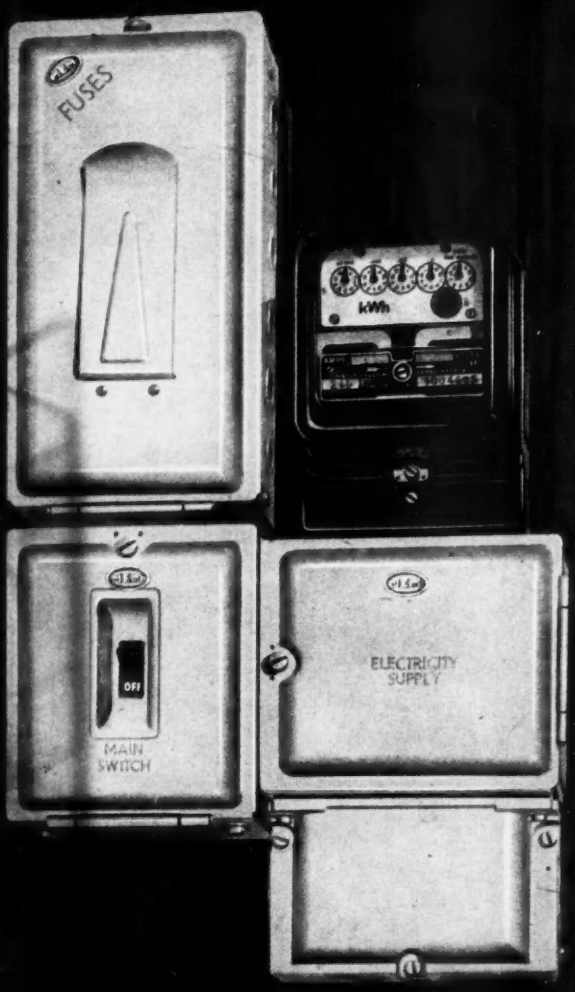
Telephone : CHAncery 3333. Telegrams : CROMPARK, ESTRAND, LONDON



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By the use of a complete range of interchangeable parts, standard bushings can be made up promptly for voltages from 600 volts to 88kV.
Current ratings from 150 to 1500 amps.

a batch of 33kV bushings

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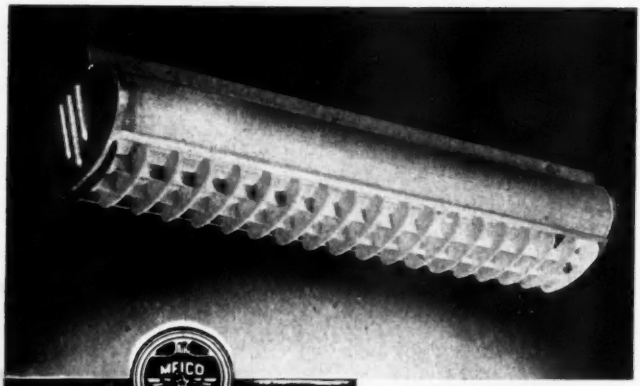

Cold Cathode establishes a special place in the field of lighting, due to their high efficiency and adaptability, with considerably longer life, instant starting, and their abi.ity to operate on reduced supply voltage. A comprehensive range of MEICO Fittings and combinations in "U" Tubes, 3 ft. Grid and Straight Tubes. Illustrated and informative catalogues available on request.

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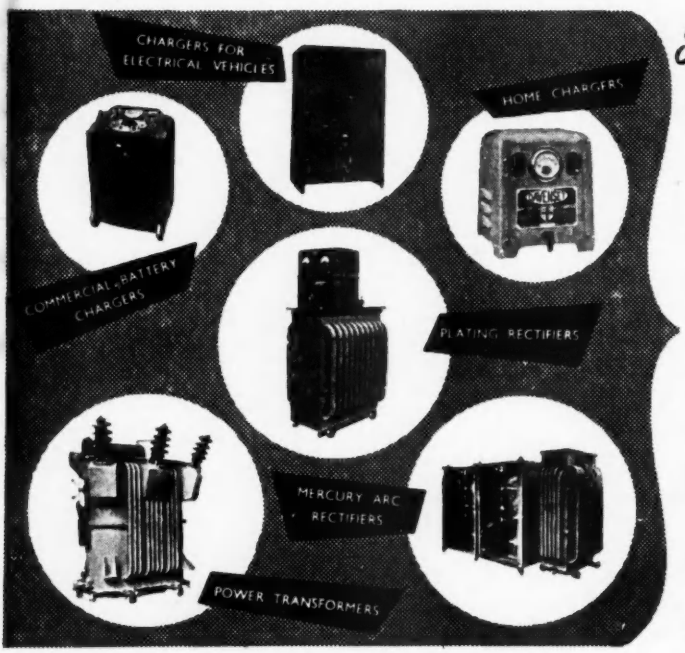

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The Davenset range of electrical equipment is designed for the needs of industry. It consists of Power Transformers up to 500 kVA, Mercury Arc and Selenium Rectifiers for battery charging, plating, precipitation, etc.

We specialise in the design and construction of all types of electrical equipment built to suit our customers individual requirements.

Please send now for free copies of Booklets Nos. 207, 214 and 217.

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INDUSTRIAL ELECTRICAL EQUIPMENT

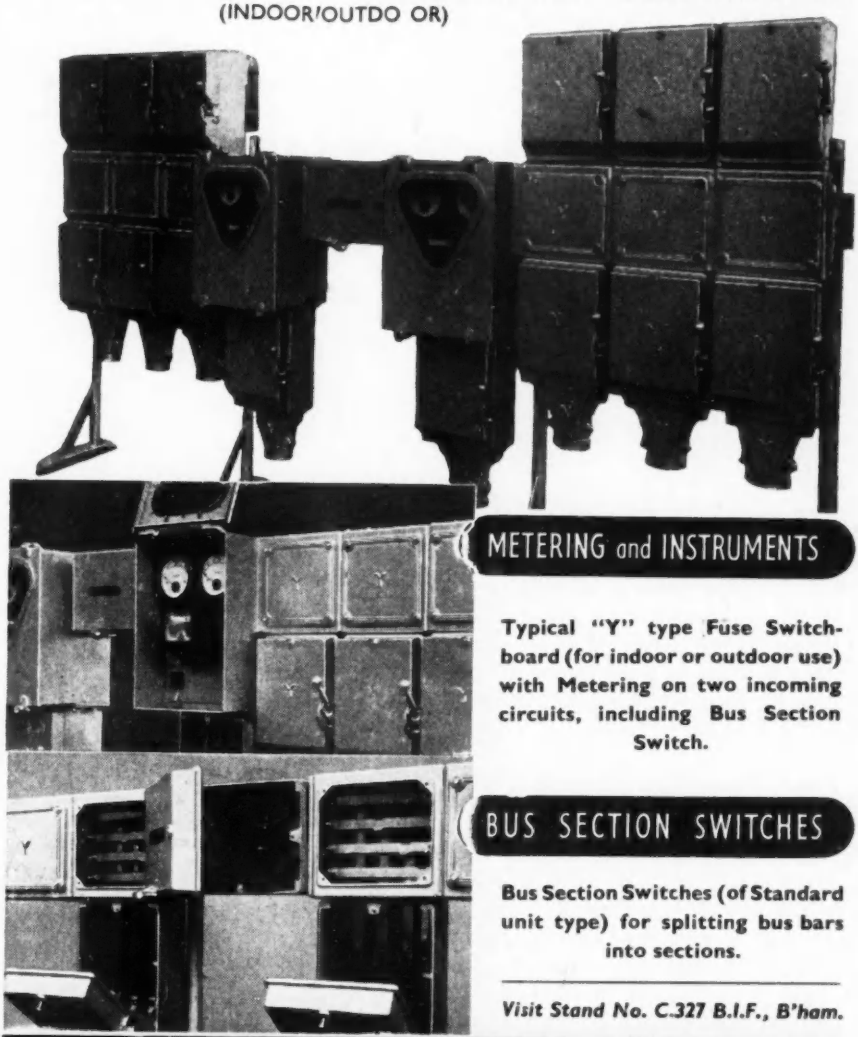
Built from the First to Last

PARTRIDGE WILSON & CO. LTD
Davenset Works . Leicester

★ *Inside Information on*

UNIT TYPE "Y" INDUSTRIAL SWITCHGEAR

(INDOOR/OUTDOOR)



METERING and INSTRUMENTS

Typical "Y" type Fuse Switchboard (for indoor or outdoor use) with Metering on two incoming circuits, including Bus Section Switch.

BUS SECTION SWITCHES

Bus Section Switches (of Standard unit type) for splitting bus bars into sections.

Visit Stand No. C.327 B.I.F., B'ham.

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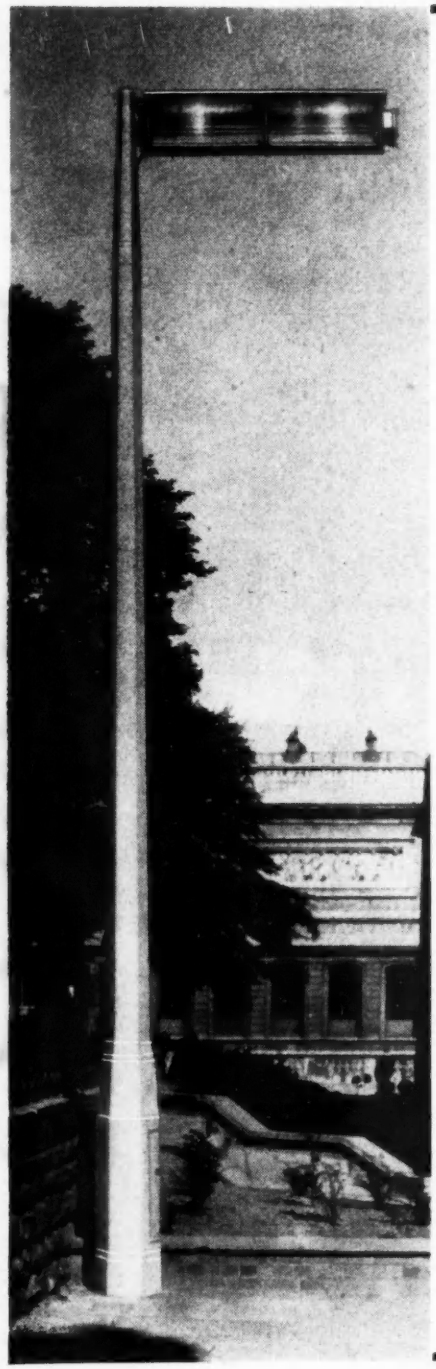
Associated with Yorkshire Switchgear and Engineering Company Limited, Leeds, 6



"Easy on the eye" by Night and Day . .

Revo street lighting fittings are designed to give uniformity of background brightness whilst at the same time eliminating all objectionable glare.

By day, they present an attractive appearance, especially when mounted on Revo artificial stone columns.

The example illustrated shows a "Sol-etern" lantern (for fluorescent lamps) on a "Phidias" standard, the latter being one of a series of Revo columns passed by the Royal Fine Art Commission.

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BRUSH
Switchgear whether embodying fuse switches or circuit breakers is robust in construction, readily accessible for maintenance—and easily extensible

The illustration shows switchboard comprising incoming feeder controlled through a circuit breaker and outgoing fuse switch circuits

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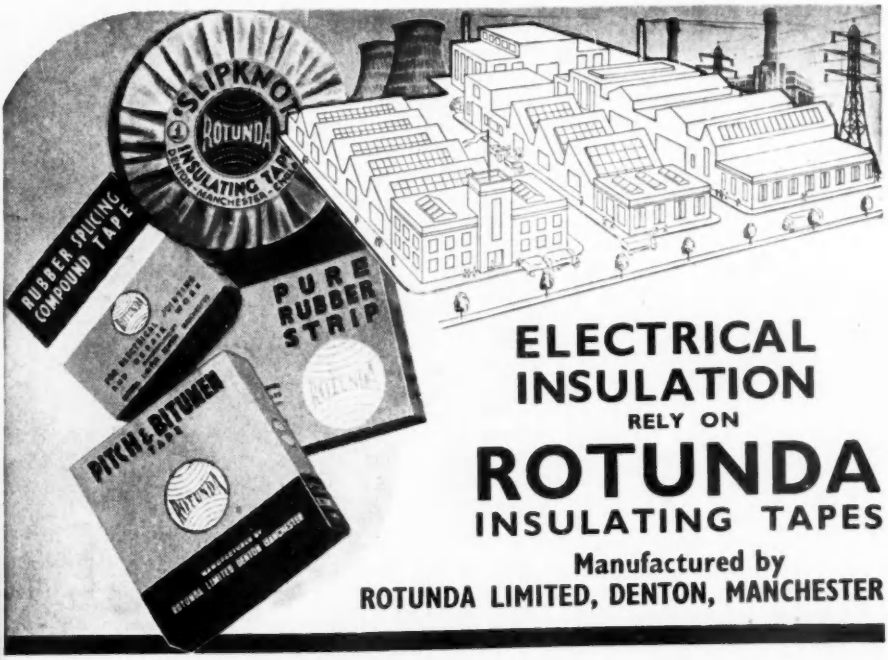

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INSULATING TAPES
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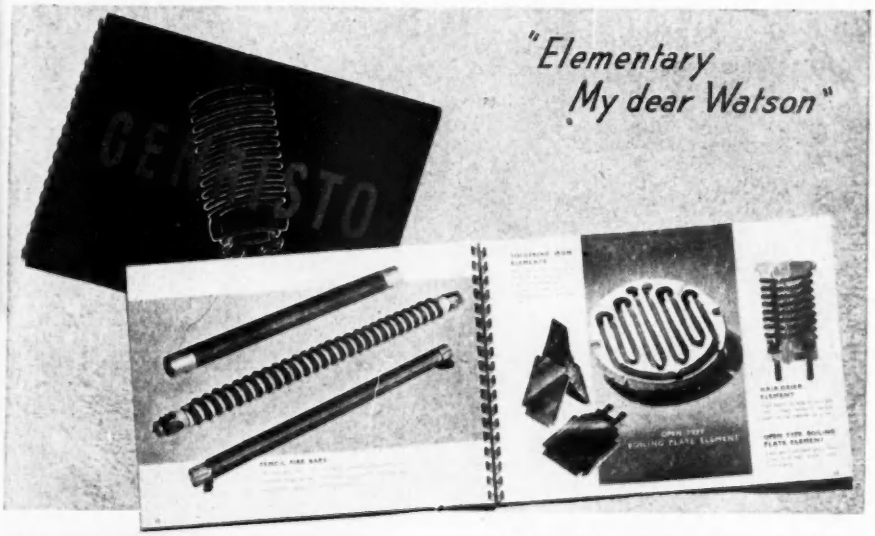

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Ordinary uneven pan base causes loss of heat by poor contact.

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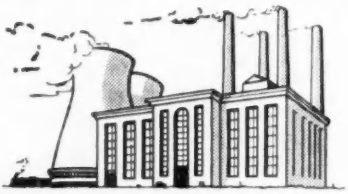

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M-W.62

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"SUPERIOR"

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Your railway engineer has known, and used this switch for roughly thirty years, because of its complete mechanical and electrical reliability, even when divorced from any form of maintenance.

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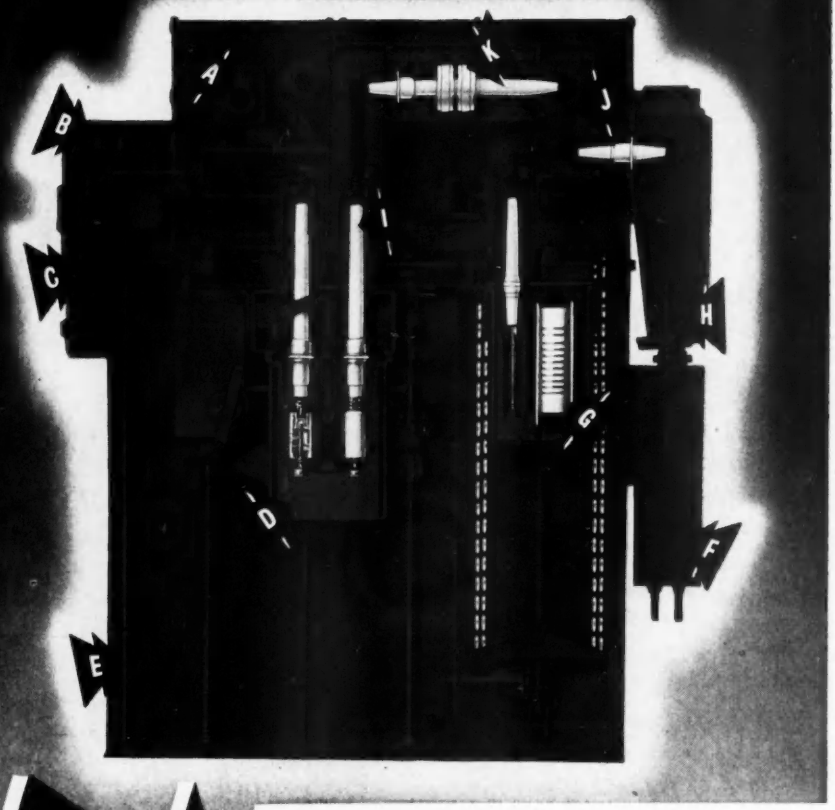

HEAVY DUTY METALCLAD SWITCHGEAR

A Condenser bushing busbars
B Continuous trunking for bus wiring
C Door giving access to the ancillary apparatus
D Low oil content circuit breaker
E Roller shutter enclosing front of the unit
F Multi-core cable box conveniently situated behind unit
G Voltage transformer
H Cable boxes suitable for all types of cable
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J Oil-filled connecting chambers facilitate removal of current transformers
K Current transformers mounted on condenser bushings are readily accessible

G.E.C.

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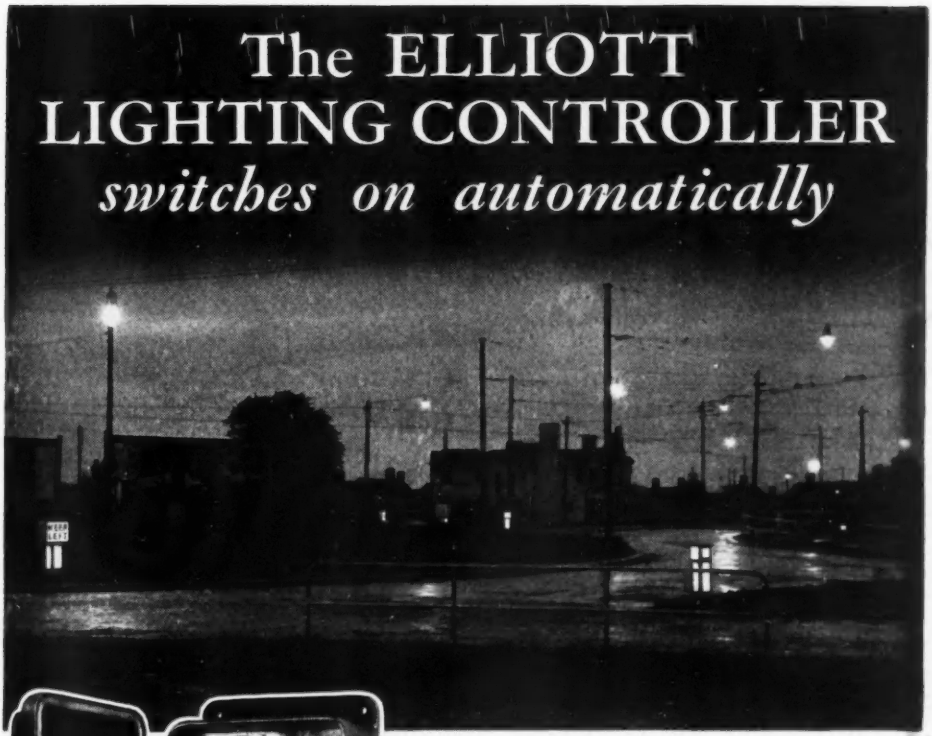
Whenever light is needed . . .

The ELLIOTT LIGHTING CONTROLLER *switches on automatically*



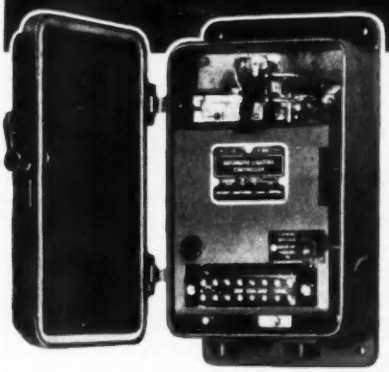


Photo by courtesy of Nottingham Corporation Lighting Committee

Reliability and simplicity are the keynotes of the Elliott Lighting Control System, which switches on whenever low light values occur, not only at night, but also during daylight storms and fog. The system is particularly suitable for remote islands, crossings, etc., as it requires no routine maintenance or resetting. Operation is by means of a barrier-layer photocell and magnetic amplifier—no valves are employed.

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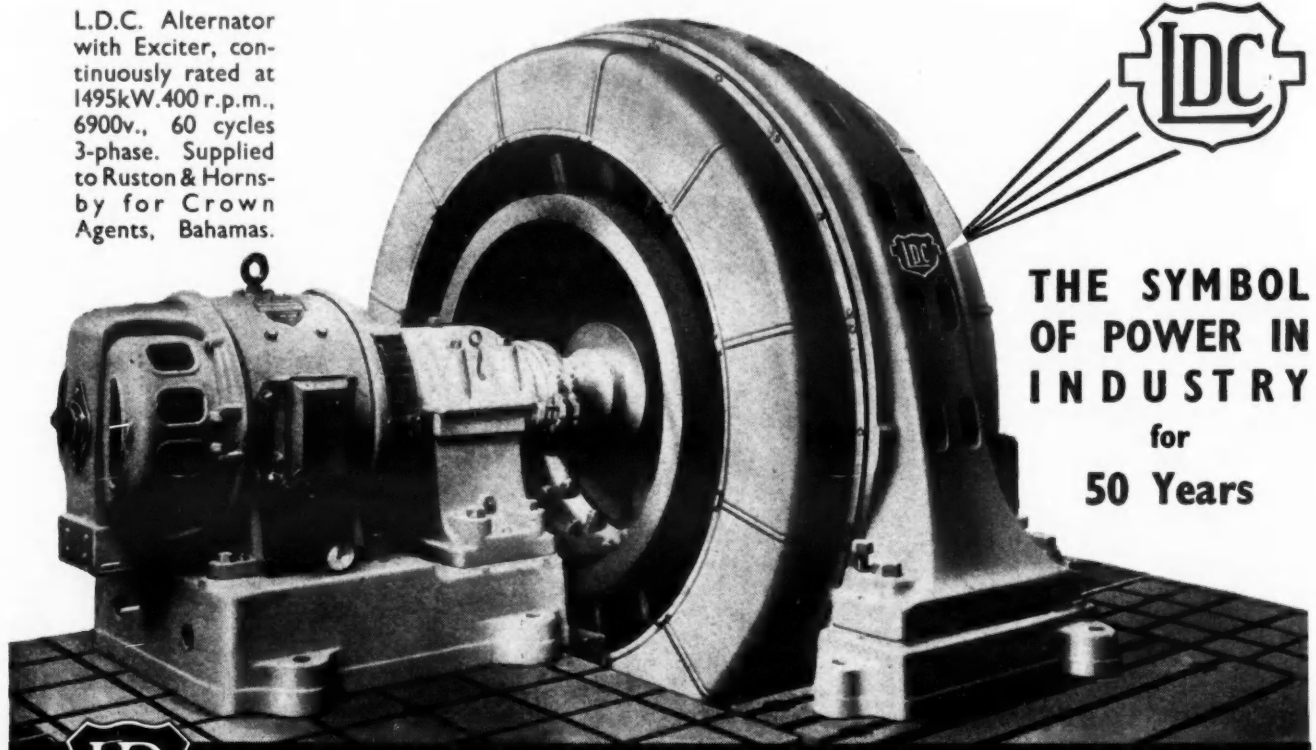
L.D.C. Alternator with Exciter, continuously rated at 1495kW. 400 r.p.m., 6900v., 60 cycles 3-phase. Supplied to Ruston & Hornsby for Crown Agents, Bahamas.



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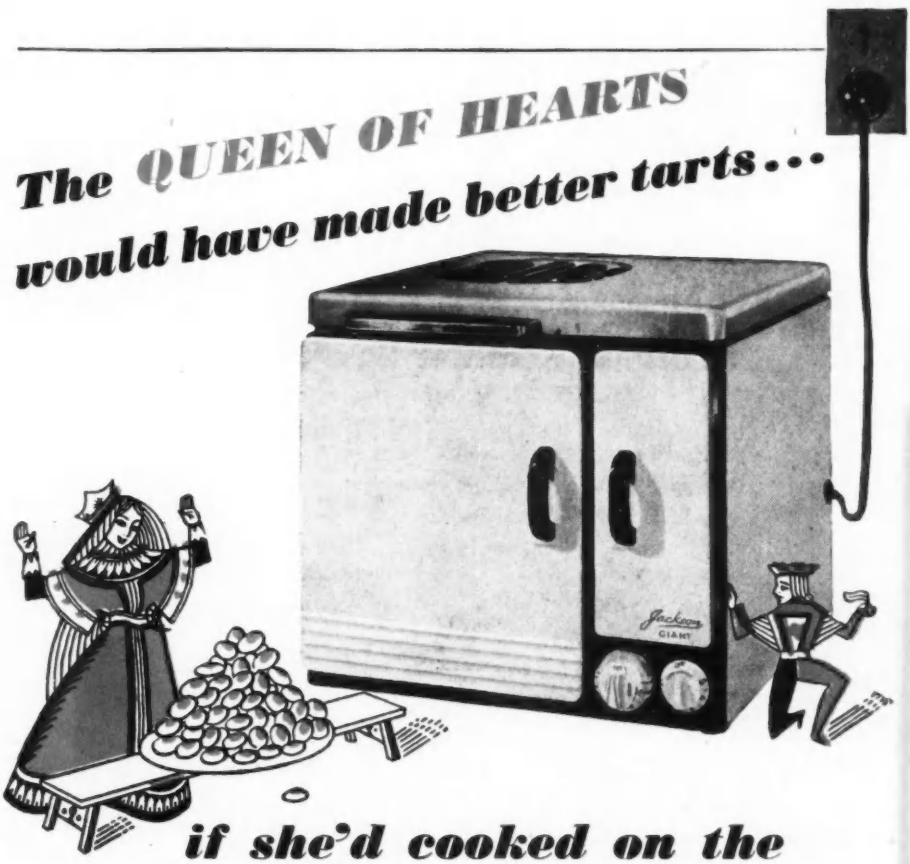

if she'd cooked on the 'GIANT' that Jackson built

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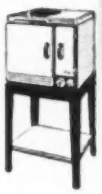

And it can be connected to a power point (13 amp.)

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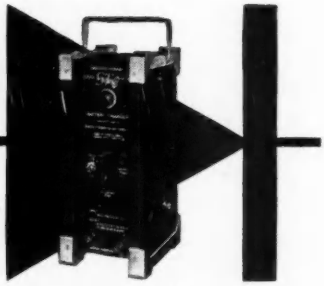

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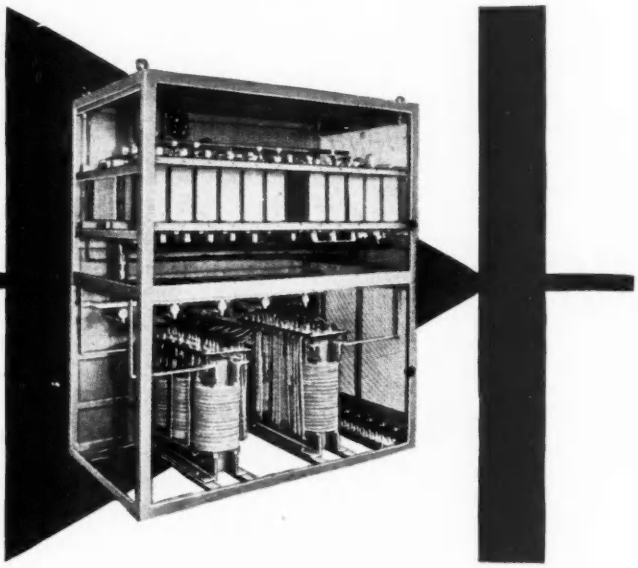

Top illustration: Portable Battery Charger
Lower illustration: Large D.C. Power Supply Unit

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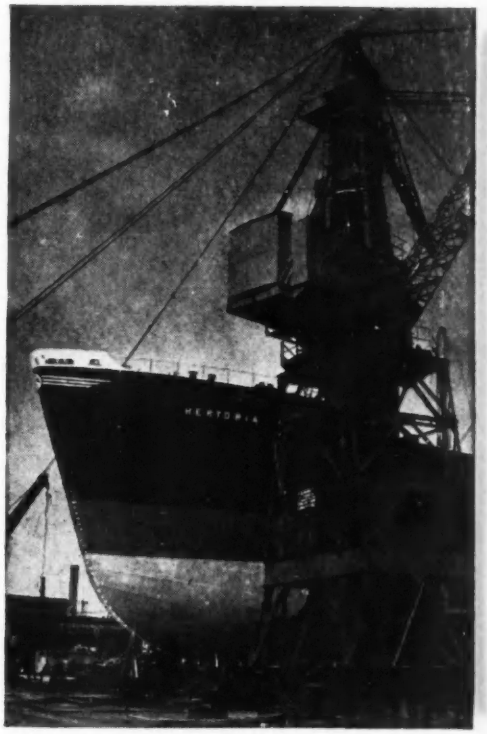
'English Electric' equipment is helping many British shipyards to quote competitive prices at a time when international competition in the industry is reaching formidable levels.



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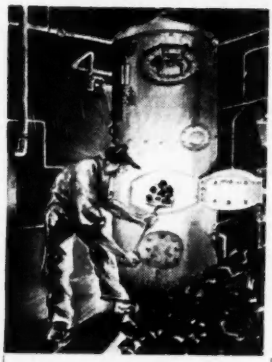
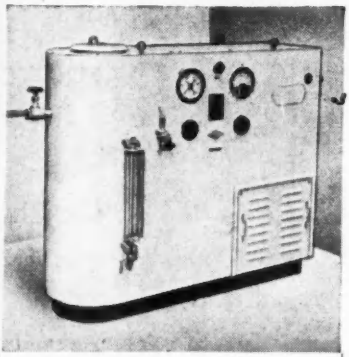


The hard way



The easy way

• • • in the past entailed not only the disadvantages of fumes and smoke from furnaces but the construction of chimneys, boiler-houses and capacious fuel storage occupying much extra space, also fuel elevators and mechanical stoking devices. But all that is done away with where the new AUTOLEC ELECTRODE STEAM RAISER is installed. Comparatively small, compact, clean, it needs no special housing building, no fuel storage or chimney. Automatically controlled, it produces maximum steam output in a few minutes starting cold, and maintains it without attention with 98% efficiency—the highest ever achieved.

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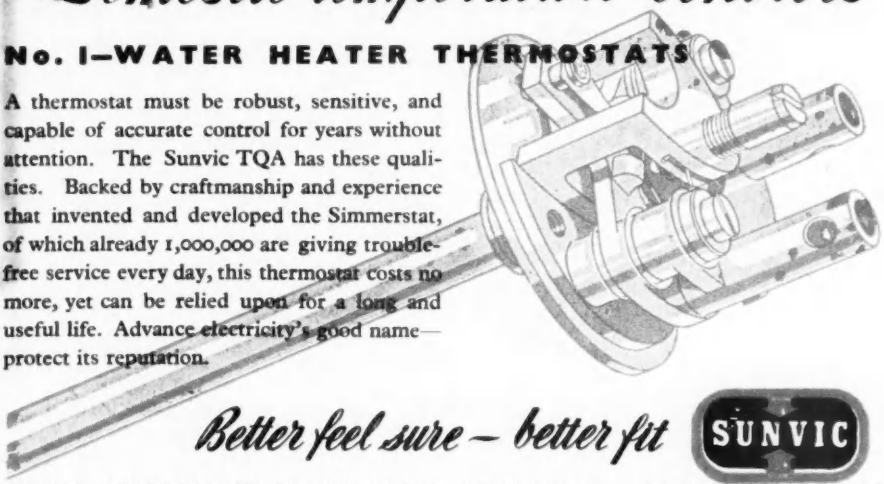
DESIGNED AND MANUFACTURED BY **G. W. B. ELECTRIC FURNACES LTD.** DIBDALE WORKS, DUDLEY. WORCS.
Proprietors: GIBBONS BROS. LTD. AND WILD-BARFIELD ELECTRIC FURNACES LTD.

Domestic temperature controls

No. 1—WATER HEATER THERMOSTATS



A thermostat must be robust, sensitive, and capable of accurate control for years without attention. The Sunvic TQA has these qualities. Backed by craftmanship and experience that invented and developed the Simmerstat, of which already 1,000,000 are giving trouble-free service every day, this thermostat costs no more, yet can be relied upon for a long and useful life. Advance electricity's good name—protect its reputation.

Better feel sure—better fit SUNVIC

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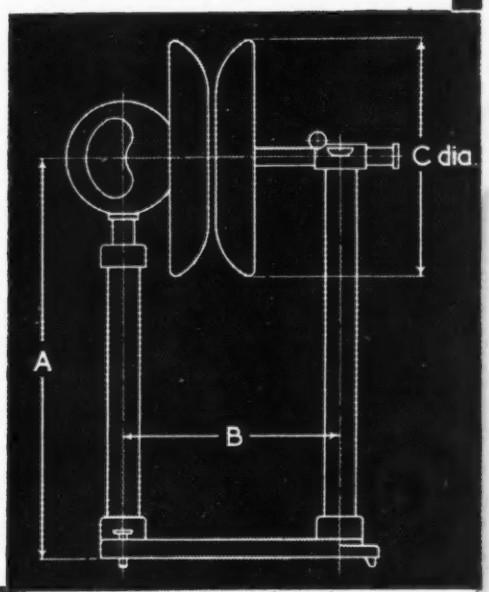

Model	Range	Dimensions (ins.) A	B	C
I	3-40 kV. 3 ranges	24⅞	12	10
II	5-60 kV. 3 ranges	24⅞	12	10
III	5-120 kV. 4 ranges	39¼	19½	18
IV	7·5-200 kV. 4 ranges	39¼	25¼	20
V	10-300 kV. 4 ranges	77	46	30
VI	30-500 kV. 3 ranges	Subject to conditions of use.		

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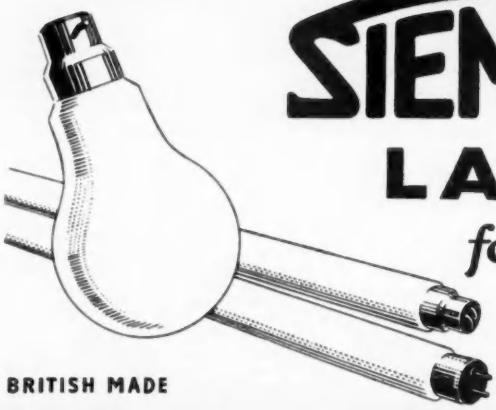
There is a



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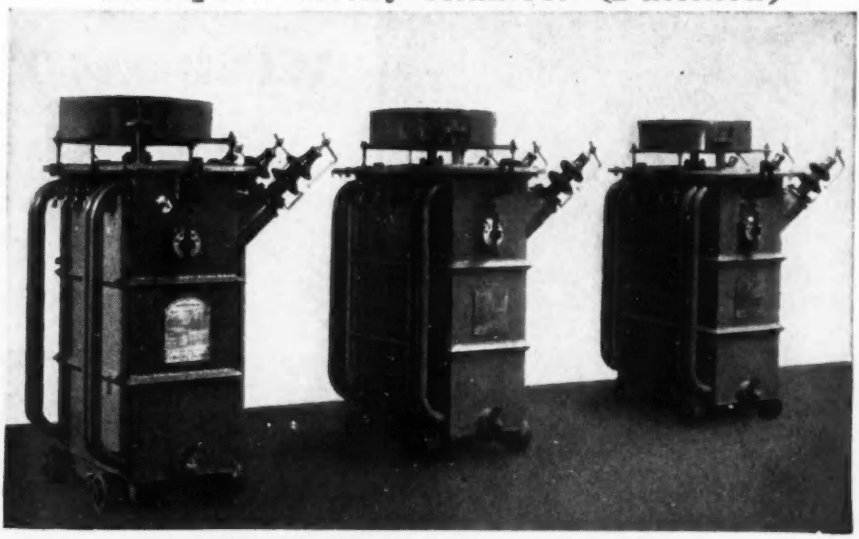

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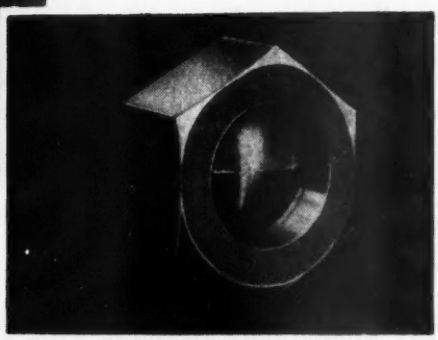
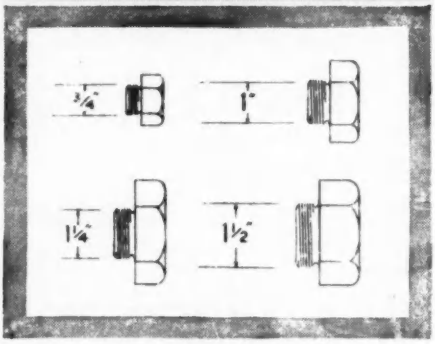
B
T-H

'WINDONUT'

Glass-steel inspection window





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to the house of **Simplex**

Simplex Electric Company Limited
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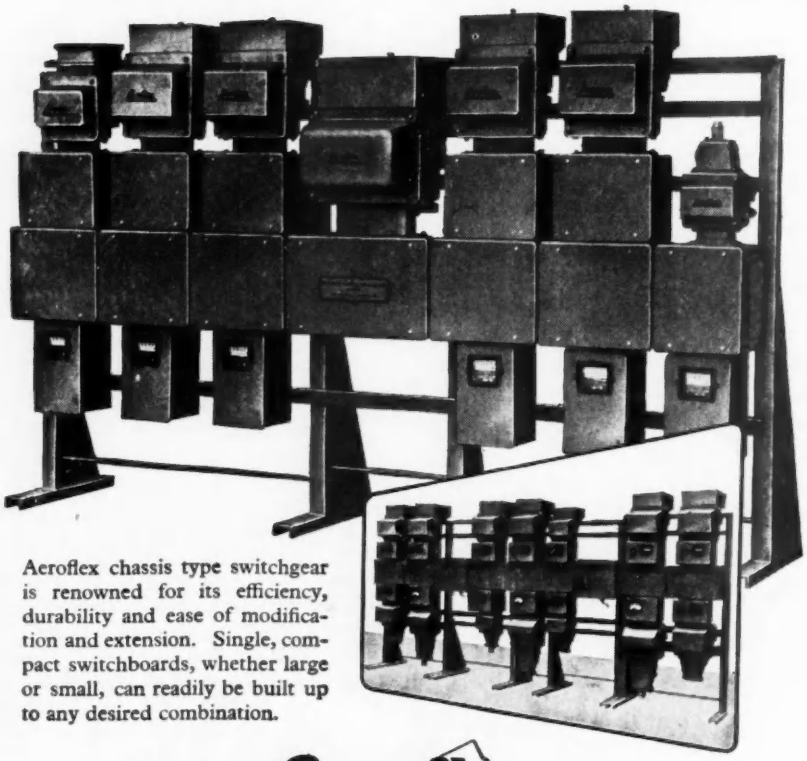
Unit Type SWITCHBOARDS



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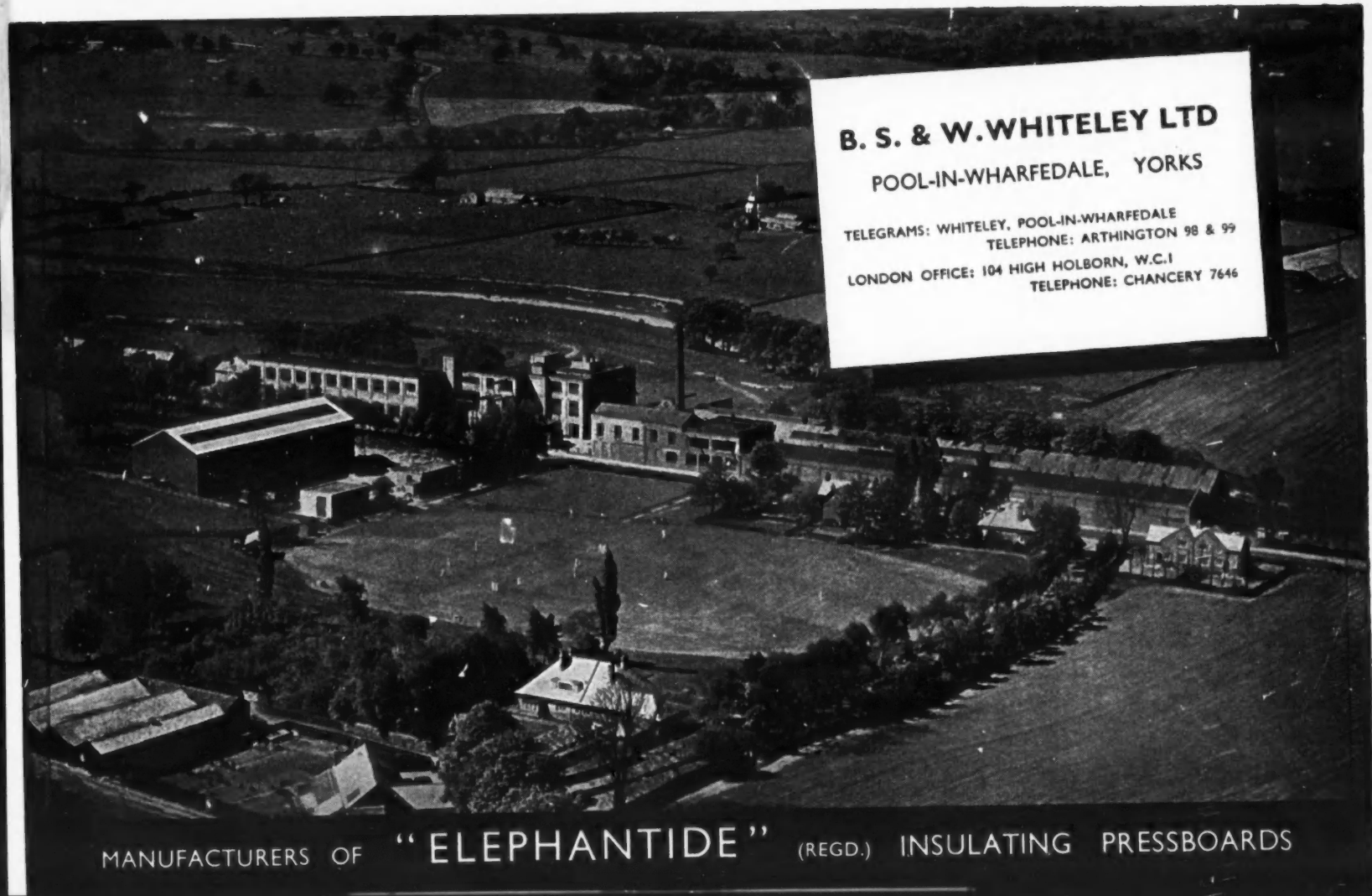
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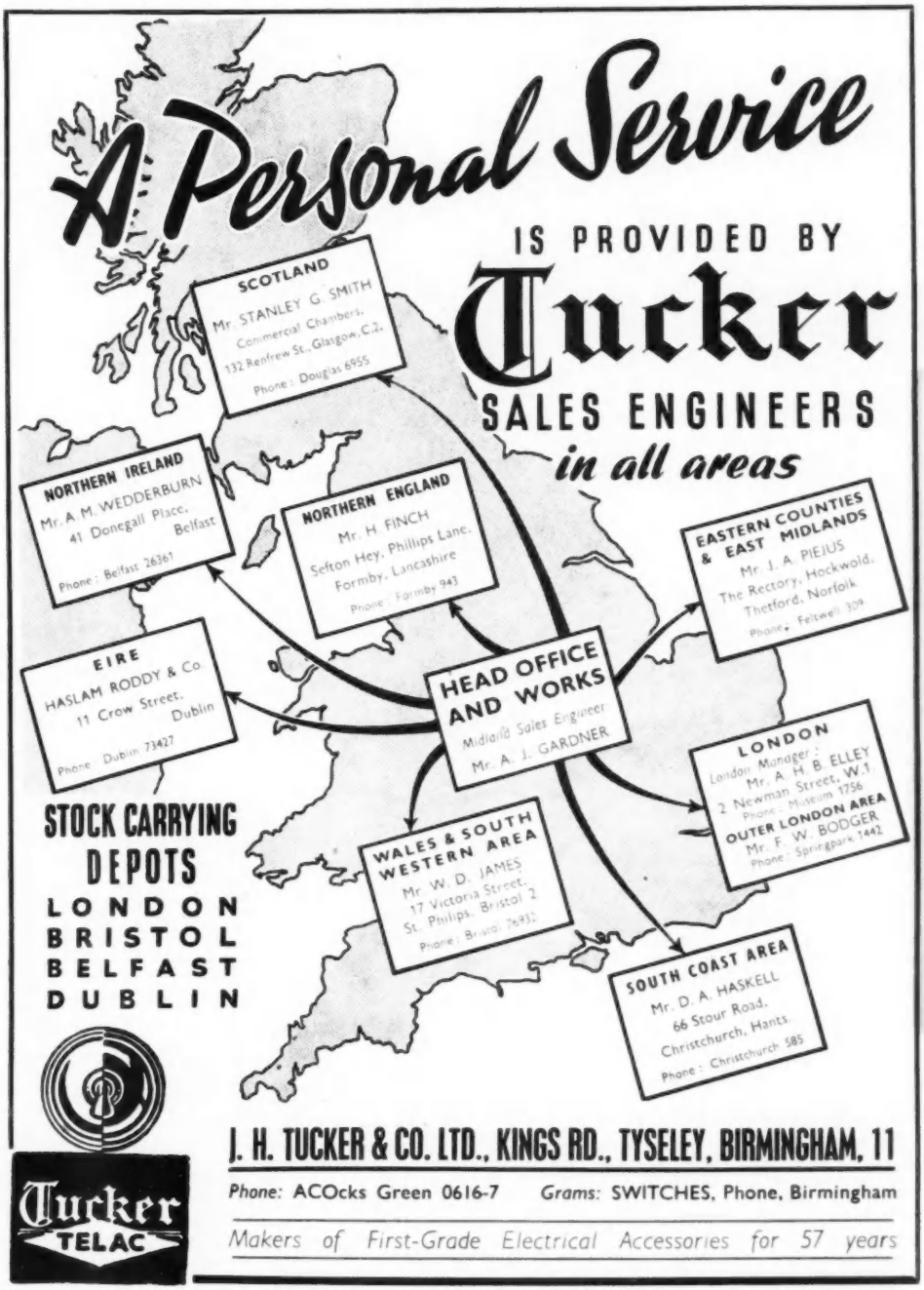
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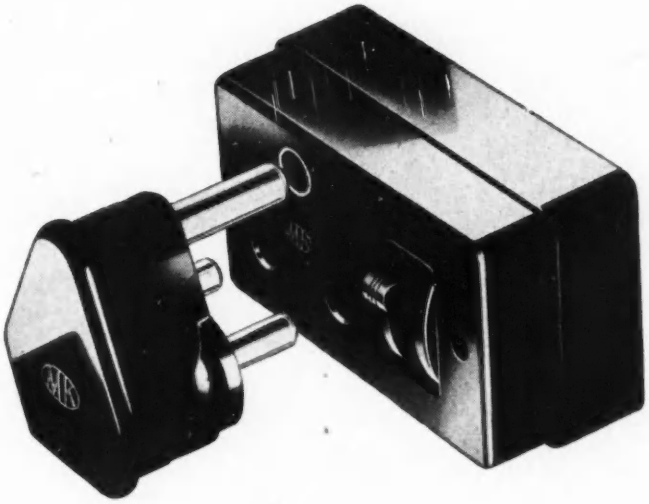

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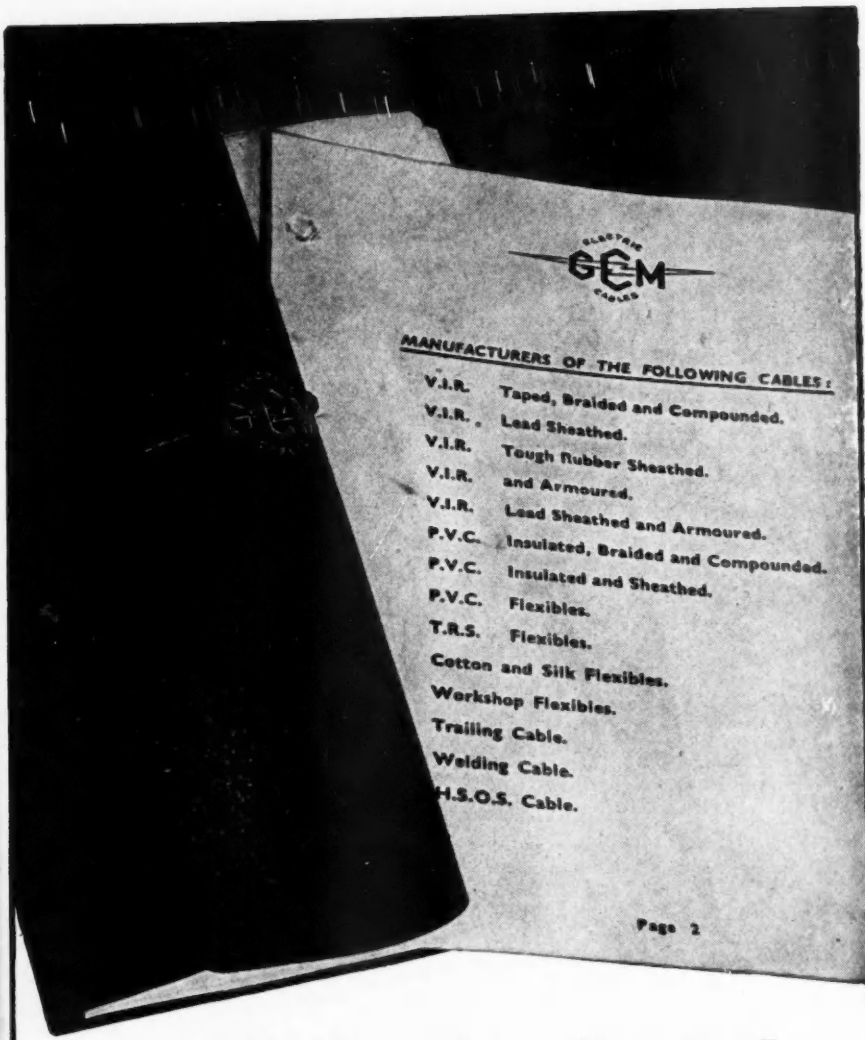

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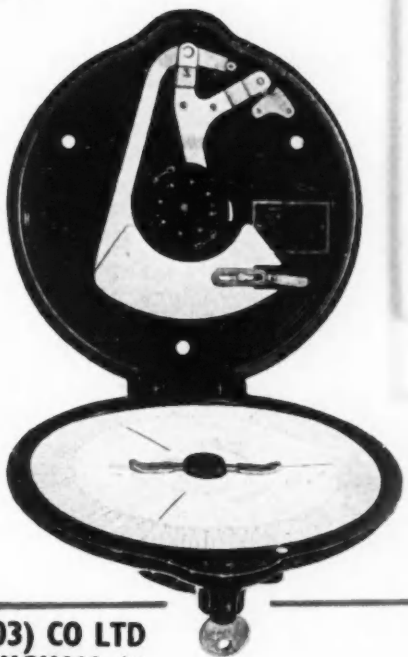

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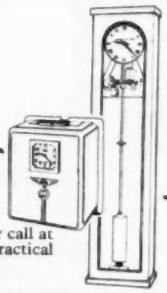

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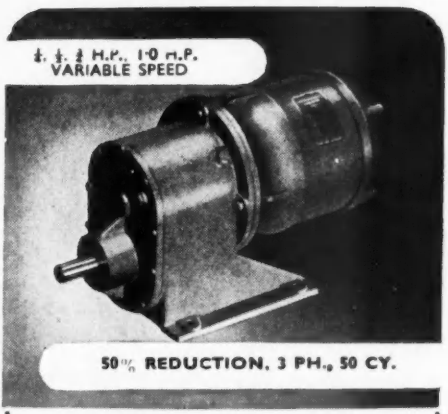

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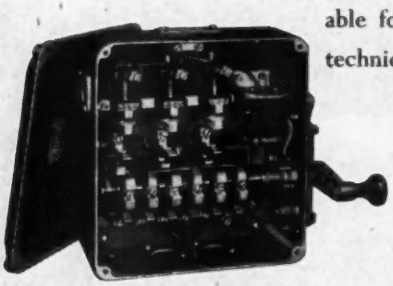

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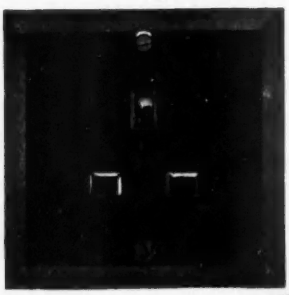

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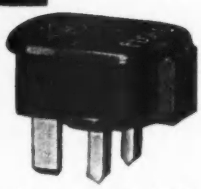

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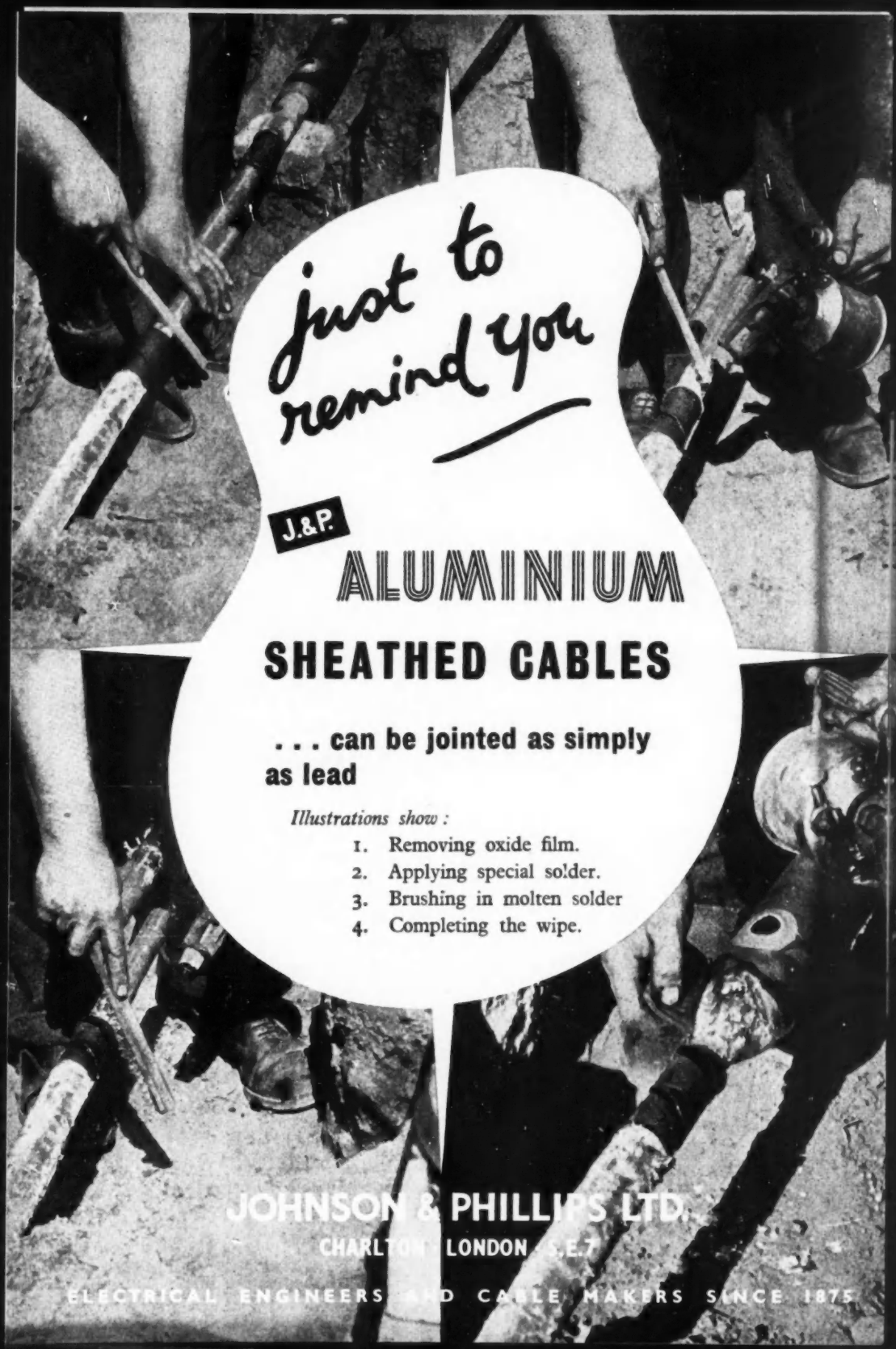
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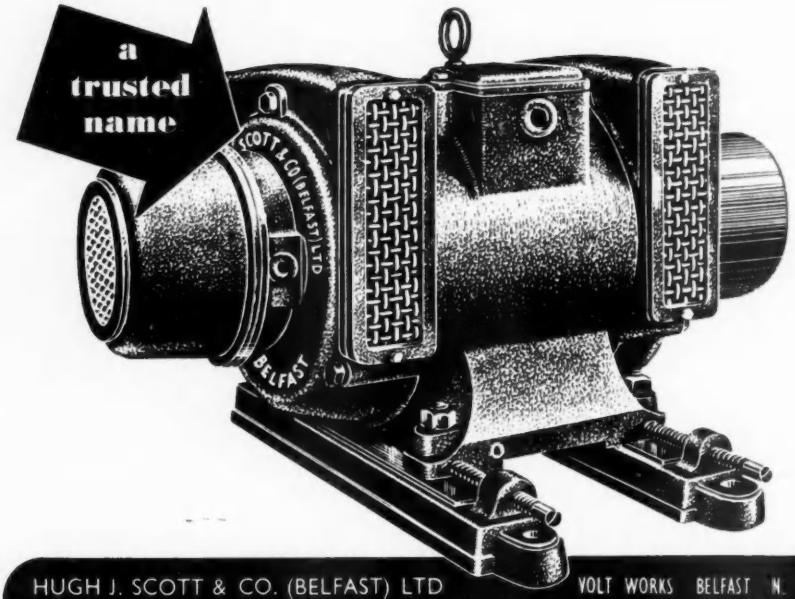

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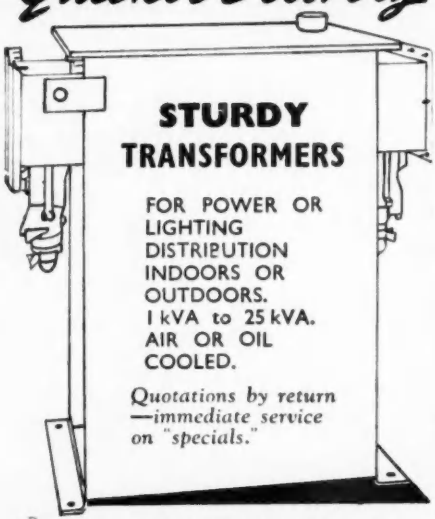

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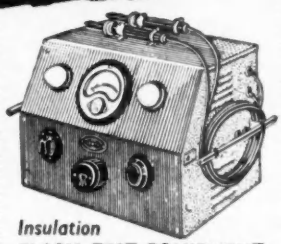

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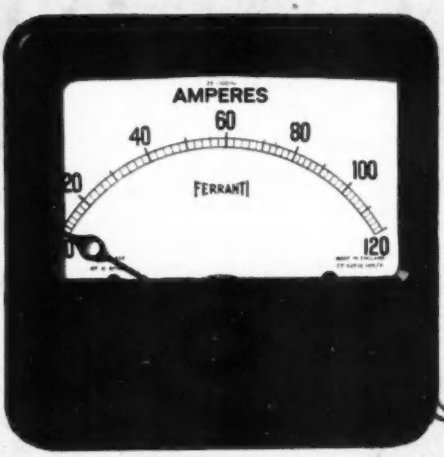

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ELECTRICAL TIMES

Vol. 119 No. 3096 THURSDAY, 8 MARCH, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

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SUBSCRIPTION RATES.—United Kingdom and Overseas £1 17s. 6d. per annum. Canada C$5 50c., U.S.A. $5 50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 6d. each.

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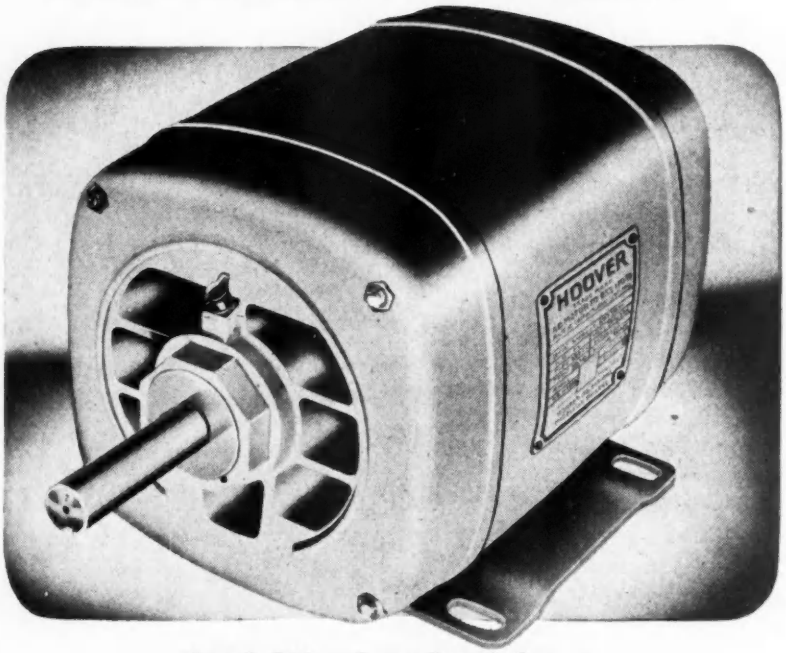

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Editorial

THE DOLLAR MARKET

FROM the time of the first clarion call for dollar exports it has been clear that the principal market for electrical goods would be Canada. That is why at the opening of the dollar drive we produced a special issue directed towards Canadian trade. Experience has shown that there is little field for exports to the U.S.A. and this was confirmed at the Dollar Convention at Eastbourne last week. But Canada is proving a valuable market even though it is by no means an easy one, and this was reflected by the substantial electrical representation at the Convention. A dire warning was, however, uttered by Mr. James Duncan, chairman of the Dollar-Sterling Trade Advisory Council, that if we once more neglect this market as we have done in the past, it will be closed to us for ever. This caution is opportune, since under the stress of rearmament it would be too easy to let this growing trade slip through our fingers. Particularly so since at the moment the dollar situation is apparently solved. However, the dollar balance has been largely achieved by U.S. purchases of sterling raw material and should the international situation change, a dollar famine might arise once more. Canada has given us a helping hand, we must be sure we do not let her down, since both countries would suffer from any such neglect.

SERVICE CENTRES

SOME area boards appear to be proceeding with an active policy of opening new service centres while others are taking a more conservative view point. A certain number of such centres is, of course, essential to the satisfactory functioning of consumer relations, but beyond that point, service centres tend to become a public luxury. The more active part now being taken in installation work may add justification to some marginal cases but with the voluntary restriction that some boards have placed on appliance sales, there is doubt whether new service centres are economically justifiable, particularly at a time of financial stress for the industry as a whole. A study of the present situation shows a variation in density of service centres which fails to follow any pattern of the differing characters of the boards. Since service centres are primarily for the convenience of the domestic consumer, perhaps the best comparison is obtained from the number of non-industrial units sold per service centre, averaged over each board. These figures show a variation from 7 to 40 million units and with over half the service centres situated below the Severn-Wash line, the average figure for these five boards is 15·8 million units (non-industrial) compared with 21·1 million for boards above the Severn-Wash line. Is one to conclude that the south is more progressive or that the north is more financially cautious? Largely, however, the situation is a legacy of the past, and some reconsideration of sites may be necessary, but at the present time of capital retrenchment new ventures should not be launched save on the strictest commercial basis, even if at all.

FIRST THE GODS . . .

MOST engineers might be forgiven for imagining that, with the publication of the Anglo-American Productivity Committee's report on motor control gear last October, the last word had been said on the subject. The open discussion which B.E.A.M.A. organised last week, while providing few opportunities for detailed answers by individual members of the team, nevertheless succeeded in spot-lighting the fundamentals of the main problem—that of direct-on starting. As *Meteor* suggested when the report first appeared, any schemes for extending this practice must rest on a solid foundation of an adequate supply, and that the first move was up to the area boards. It was good to learn from Mr. Gibson of the Midlands Board that a committee representative of all areas was not

only in existence, but actively engaged in ironing out some of the anomalies between local regulations, as well as tackling the problems involved in planning network reinforcement. If, as Mr. Gibson stated, we may hope for results sooner than has been generally expected—even though we may not all get what we want—the foundations of simpler and cheaper control gear have been well and truly laid.

. . . AND THEN THE MACHINE

ONE of the control gear manufacturers' major headaches is that while the B.S.I. specify 6 times full load as a reasonable starting current for contactors, machine designers specify 8, 10, 11 or even 12 times for their motors, necessitating, of course, a larger size of contactor as the least inconvenience involved, in addition to troubles on cables and protection. Except in peculiar cases, such as a two-pole totally enclosed (and therefore de-rated) machine, no designer worth his salt would require such high starting currents unless forced by specific requirements, when he finds himself between the deep sea of the circle diagram and the devil of the commercial department. If the customer will insist on unnecessarily high starting torques then the designer must swallow his professional pride and produce a machine with a performance that he prefers not to remember. It seems that the next move in the direct-starting campaign is for the motor manufacturer to educate his customers into realising that owing to the inconvenient restrictions of the laws of mathematics, they cannot have it all ways. To expect the designer to tailor his machine to the control gear is to put the cart before the horse. But at least let it be tailored to the actual job and not to one which exists only in imagination.

INACCURACIES OF HEAT

HEAT is involved as a factor in most branches of engineering, and any question of heat soon involves the measurement of temperature. For the electrical engineer, temperature is specially important, because of its effect on the working properties of dielectrics, and it is a continual source of concern to him that he cannot measure thermal quantities to the same few parts in a hundred-thousand accuracy with which he can deal with volts and amperes. A temptation arises to make electrical measurements and to deduce from them related thermal values. Against this procedure, a strong warning was given last week during an I.E.E. discussion reported elsewhere. Many of the quantities involved in the transfer from electrical values to heat units are known to vary considerably with minor changes of temperature, while more disturbing still is the fact that so fundamental a quantity as J, the mechanical equivalent of heat, appears somewhat uncertain in value judged on the standard of accuracy possible with electrical measurement on balance, relatively simple thermal measurements may give all the accuracy that is possible.

NO-CUT COUNTRY

ESTIMATES of the vital statistics of electrical supply in a country with no power shortage were given recently by the American periodical *Electrical World*. Unit sales in the United States increased by 12·2% during the year, a boost for which the increased industrial effort is probably responsible, since the average yearly increase since the war has been 7·6%, nearly equal to that applying in Great Britain. The difference between the situation in the two countries is seen more clearly when generating capacity is compared. Some 4,400 MW of plant were added to the 63,100 MW already in commission in the U.S., this 14·3% increase in plant more than keeping pace with the growth in overall demand. Moreover, with the prospect of sales continuing to increase at a high rate, the new plant capacity firmly planned for installation over the coming years is 41,000 MW, nearly three times the capacity at present installed in this country, and 61% of the present total in the United States. Such is the price of avoiding a power shortage; yet with increases running at such a rate, and one-quarter of the plant hydro-powered, the average load factor for the year in America was 57·5%.

Meteor

Servicing Fluorescent Lamps

by W. A. R. Stoyle,* B.Sc., A.M.I.E.E., F.I.E.S.
and G. D. Jones-Thomas,* F.R.S.A.

THE rapidly expanding use of fluorescent lamps, whilst giving great benefit to the field of electric illumination, has brought fresh problems to those responsible for their installation and servicing.

If the performance of the lamps is to be satisfactory as regards life and light output, correctly designed control gear must be used, thus running the lamps at the current and voltage for which they are designed.

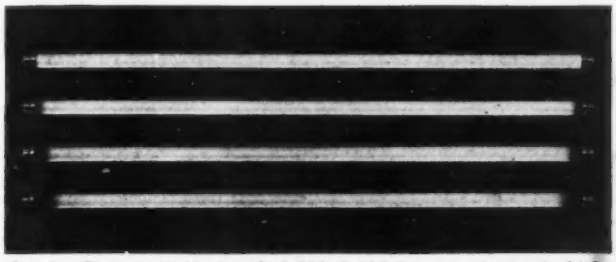


Fig. 1. Fluorescent lamp at 0, 1,000, 2,000 hours, and at end of life

The maintenance engineer must have adequate testing gear to obtain starting and running data and the common practice of changing one component after another until everything *looks* correct, cannot be too strongly condemned.

General

Although the servicing of a fluorescent lamp installation is not quite as simple as that of a tungsten lamp installation, it should present no serious difficulties. Minor faults in the circuit and control gear sometimes occur but the most likely difficulties are due to the mains voltage, ambient temperature, the lamp itself, its control gear or some maladjustment thereof. Generally speaking, such faults are comparatively simple to trace and remedy.

A circuit which is not operating normally should be disconnected from the supply until the defect can be remedied; if several lamps are operating from the same main circuit switch, the lamp should be removed from the defective unit and this particular circuit locally isolated. A new lamp should not be tried in a circuit which has been operating abnormally unless it has been established that the circuit itself is not faulty, or until the original fault has been rectified.

Abnormal operation under low ambient temperature conditions may occur, but trouble from this cause alone is unlikely as low mains voltage often (and unfortunately) coincides with temperature fall. As the mains voltage falls, the current through the lamp falls and the voltage across the lamp rises. If the lamp is operated by a glow-type starter in these conditions, the voltage across the lamp and starter may rise sufficiently to cause the starter to close, thus extinguishing the lamp, or preventing it striking when first switched on. Alternatively, if a thermal-type starter is being used, the reduction in lamp current arising from an abnormally low mains voltage may cause the starting-switch contacts to close. It is also possible that the reduced lamp current will be insufficient to keep the electrodes up to temperature for stable operations, apart from irregular operation of the starter switch.

Assuming that the external conditions are sensibly normal, a lamp may (a) attempt to strike, (b) glow continuously at the ends, or (c) may not attempt to strike at all. The possible sources of trouble in the three cases are tabulated in Tables 1, 2, and 3.

Many of the factors in the above three schedules are obvious and require no additional explanation.

Lamps

The most likely cause of lamp failure is that it has had its normal life. As has already been mentioned, the active electrode coating is necessary for starting and maintaining the discharge through the lamp. When a lamp is nearing the end of its life this electrode coating is practically exhausted but the electrodes, still being electrically intact, complete the cir-

*General Electric Co. Ltd.

Table 1.—Lamp will not strike

(a) Lamp	(i) Broken electrode.
	(ii) Cracked tube.
	(iii) Faulty lamp.
(b) Starter switch	(i) High-striking voltage (glow type).
	(ii) Broken bi-metal (glow or thermal type).
	(iii) Cracked bulb.
	(iv) Open circuit in heater coil (thermal type).
	(v) Switch contacts will not close (thermal type).
	(vi) Short-circuited contacts (glow type).
(c) Control gear	(i) Open-circuited choke.
	(ii) Open-circuited capacitor (T.L. circuit).
(d) Wiring	(i) Disconnection in wiring.
	(ii) Lampholders or starters not making contact.
	(iii) Incorrect wiring.

Table 2.—Lamp attempts to strike

(a) Lamp	(i) Life expired.
	(ii) Faulty lamp.
(b) Starter switch	(i) Contacts break too quickly (glow or thermal type).
	(ii) Low extinguishing voltage (glow type).
	(iii) Incorrect voltage starter (glow type).
	(iv) Incorrect rating of starter (thermal type).
(c) Control gear	(i) Incorrect choke or choke tapping.
	(ii) Incorrect capacitor in T.L. circuit.
(d) Wiring	(i) Heater coil and switch contacts of thermal-type starter reversed.

Table 3.—Lamp electrodes glow continuously.

	(i) Starter switch contacts stuck together.
	(ii) Radio suppressor broken down.
	(iii) On instant-start circuit, starting strip not properly earthed.

cuit through to the starting switch. The switch contacts, therefore, open and close and the voltage surge causes a momentary "blink" in the lamp but, because the electrode coating is exhausted, the discharge through the lamps is not maintained. This cycle is then repeated by the continued periodic operation of the starting switch, and there is a periodic "blinking" usually accompanied by a shimmering effect in the discharge. A further indication in a lamp nearing the end of its life is the deep orange-coloured glow of one or both electrodes.

At the end of life, fluorescent lamps generally show a dense blackening at one or both ends, either in the form of general blackening or as a clearly defined ring near the electrode. This end blackening is progressive throughout the life of the lamp, and Fig. 1 shows examples of a typical lamp before use, at 1,000 hours, 2,000 hours, and at the end of life. Sometimes also, dark streaks or small dark patches may appear along the length of the lamp during life. This is due to condensation of the mercury vapour on the lower, and, therefore cooler, part of the lamp. Rotation through 180 deg. will give a more favourable position for evaporation.

Cracked lamps and broken electrodes should be obvious from visual examination or by testing the electrodes with any normal form of continuity tester. If only one electrode is broken a faint glow at this end of the lamp may be noted, as some of the mains voltage will exist across the broken ends.

If the lamp is faulty from other causes it will probably try to start in a similar manner to a lamp which has had a normal life and whose electrode coating is exhausted.

Starting Switches

(i) Glow Type.

The satisfactory operation of the glow starting switch depends on its voltage and time characteristics, which are controlled by the manufacturer to close limits. For example, if the "striking voltage" of the glow switch is too high, the switch contacts will not close and the lamp discharge will not start. Again, if the "extinction voltage" of the switch is too low, the switch contacts will tend to close after the lamp has struck, causing periodic blinking. The switch will also tend to close if the voltage across the lamp is abnormally high, either due to low mains voltage or to the use of incorrect ballasting.

If the switch contacts, through some fault or incorrect spacing of the bi-metal strip, operate too quickly, the lamp electrodes may not have time to heat up before the switch contacts open again, producing repeated flashing and accelerated dissipation of the electrode coating. On the other hand, if the switch contacts operate too slowly, the lamp electrodes will be unnecessarily overloaded. Clearly, therefore, the "relative ease" of the start is important and a switch that does not start a good lamp in a few seconds should be replaced.

A normal switch will, however, outlive several lamps, and whilst the lamp life is, to some extent, influenced by the total number of switchings throughout life, the lamp may be switched many thousands of times before any substantial effect on switch performance is likely to be noted. It should also be stressed that where two voltage ratings of glow switch are available, 200/220 and 230/250, correct ratings of switch should be used for the particular mains voltage concerned.

(ii) Thermal Type.

As with the glow switch, the thermal switch contacts must not break too quickly or the electrodes will have insufficient time to become incandescent; also, the thermal switch current rating must correspond to that of the lamp. Thus a thermal switch suitable for a 20-watt lamp may operate too quickly with a 40-watt

CIRCUIT DIAGRAMS

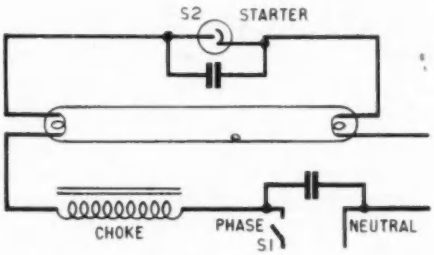


Fig. 2. Choke-controlled lamp with glow starter

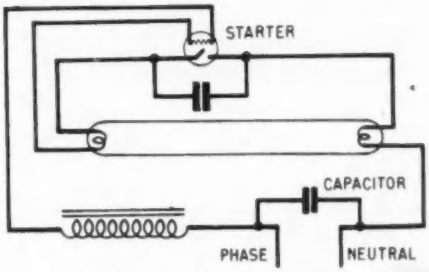


Fig. 3. Choke-controlled lamp with thermal starter

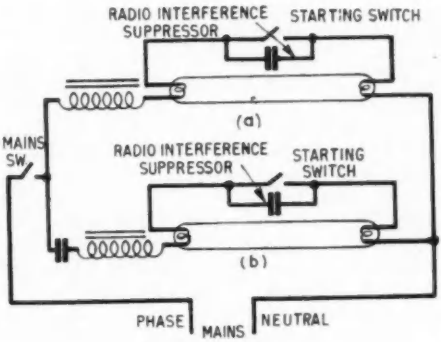


Fig. 4. Twin lamp

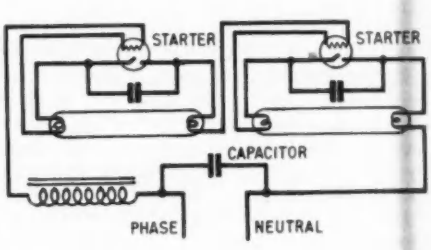


Fig. 5. Two in series

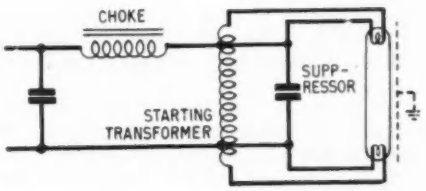


Fig. 6. Instant-start

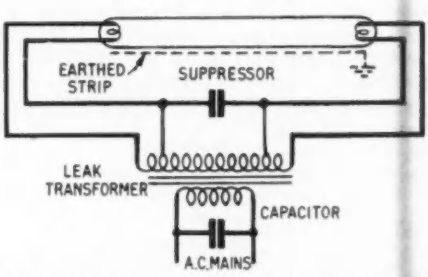


Fig. 7. Inductive circuit for 8 ft 125 W lamp

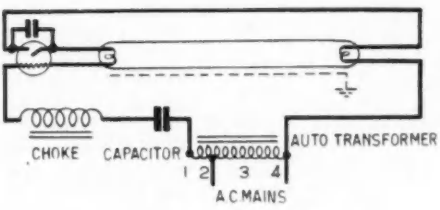


Fig. 8. Capacitatively-controlled circuit

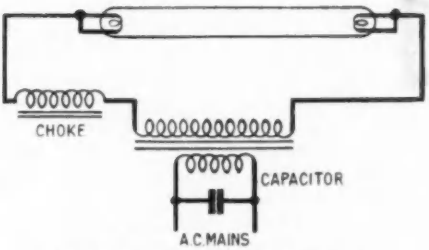


Fig. 9. Circuit for 8 ft 70 W lamp

lamp and an 80-watt thermal switch may not operate at all on a 40-watt circuit. Use of an incorrect rating may result in the heater coil burning out.

Continuity of the heater coil may be checked across the smaller pair of contacts of the canister type switch.

Chokes and Capacitors

Intermittent working or bad starting may be due to the wrong value of inductance or capacity in series with the lamp. As the lamp current is controlled by series equipment, too low a series impedence will result in overloading of the lamp and auxiliaries and too high a value of impedance will result in inadequate current and uncertain operation. The starting and operating current should, therefore, be measured if the control gear is suspected.

An open circuited capacitor connected in series will, of course, result in non-striking of the lamp, but if connected in parallel, will only be obvious if the mains as well as the lamp-running current is measured. Capacitors should take about 72 milliamps per microfarad at 230 volts, and can easily be tested by connecting them across the mains with a suitable meter in series.

Short circuits in chokes and capacitors, though rare, can have more serious effects as described in the section below. A short circuit or partial short circuit in a choke is best checked by connecting the suspect choke in series with a similar choke across the mains and measuring the division of voltage across the chokes. A normal choke of any particular rating may be connected directly across the mains and the short circuit current should not be materially in excess of the lamp starting current.

Wiring Faults

Diagrams of connections are shown in Figs. 2-11.

An earth fault in the wiring of a fluorescent fitting can cause complete destruction of one or both lamp electrodes, the starting switch, and damage to the choke coil itself. The effect of this fault will, of course, depend on the particular position of the earth in the circuit and the manner in which the phase and neutral leads are disposed. A lamp overloaded in this manner generally shows quite clear visual indications; the lamp electrodes are blown off, the lead-in wires are fused and the electrode coating volatilised on the walls of the lamp.

Because, during the starting period, momentary voltages of the order of 800 to 1,000 may be produced, breakdown may occur in the wiring or in the radio suppression capacitor if the insulation of these components is poor. Breakdown of this capacitor may cause a short circuit across it which will effectively short circuit the lamp, in which case the lamp electrodes will glow continuously and the lamp will make no attempt to start.

If the choke coil is connected in the neutral lead of the mains supply an earth fault on the wiring between the choke and the lamp or on the wiring associated with the starter switch will, clearly, short circuit the choke so that there is no limit to the current and the lamp electrode and starting switch will be damaged or destroyed. On the other hand, if the choke is connected in the phase lead an earth fault will place the choke across the mains, which will slightly overheat the choke, but as the choke is still limiting the current to the value of the choke short circuit current, the lamp electrodes or the starting switch will not be seriously damaged if the circuit is switched off in reasonable time.

It is recommended, therefore, that the choke should be connected in the phase lead of the supply. If it is suspected that a previous lamp failed through an overload, the fitting should be checked over for earth faults before a new lamp is installed.

If the lamp in the capacitive branch of the twin-lamp circuit is connected across the capacitor, catastrophic overloading will occur due to a high resonance voltage developing across the capacitor. The same effect is produced by connecting the ordinary parallel P.F. capacitor across the lamp instead of across the mains.

It is important to ensure that the heater coil of a thermal starter is wired between the choke and lamp electrode and not between choke and mains lead. In the latter case the surge voltage is applied between heater and switch contacts and is likely to cause switch breakdown.

Premature Blackening

Excessive blackening of the ends of the lamp, occurring early in life, indicates that the electrode coating is being dissipated too rapidly owing to abnormal operating conditions, which may result from one or more of the following causes :—

1. Overloading due to excessive mains voltage.
2. Overloading due to incorrect choke or capacitor or defects therein.

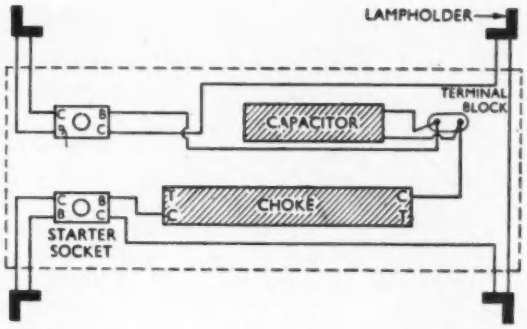
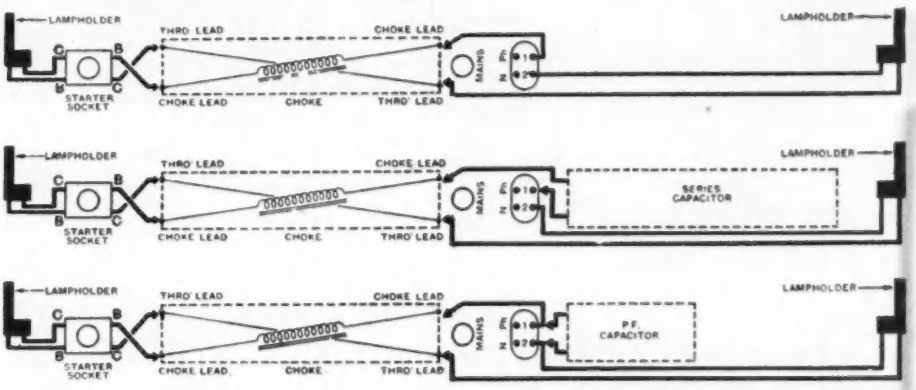


Fig. 10 (on right) Practical wiring diagram for series-operated lamps

Fig. 11 (below) Practical wiring diagrams of inductively and capacitatively controlled lamps



3. Defective starting switch causing lamp to blink on and off or prolonged flashing at starting.

It must be remembered that low voltage and ambient temperature conditions will cause bad starting, and bad starting, if prolonged, will result in premature blackening.

The choke rating and average mains voltag, should be carefully checked and, if necessary the starting switch replaced. A fault in a choke coil is extremely rare, but when it does occur it is sometimes not easily traced by visual inspection. A serious fault may give rise to burnt insulation or seepage of the wax through the metal container.

PRACTICAL TESTING METHODS

As previously pointed out, the satisfactory operation of fluorescent lamps is dependent on the correct control gear being used so that the lamp is operating under the conditions for which it was designed. If the appropriate choke coil is used for the average mains voltage concerned, the lamp should be consuming a power very close to the rated lamp wattage. If it is desired to check this consumption, it can be derived from the lamp voltage and current. It should be noted that the lamp wattage will be obtained by multiplying the product of lamp volts and current by a form factor of approximately 0·9.

It is often found difficult to test the starting and running conditions of fluorescent lamps and control gear under normal working conditions unless the wiring is altered to enable the necessary meters to be connected.

The simplest form of testing device consists of a wooden block fitted with a canister socket, normally-open and normally-closed push buttons and terminals as shown in Fig. 12A, the connections being as shown in Fig. 13. Associated with this are a number of flexible adaptor leads, one consisting of two canister starters with the switches and suppressors removed (Figs. 12B and 14) while the other, for 80 W lamps utilises BC and SBC adaptors and holders as shown in 12C and 15. Other

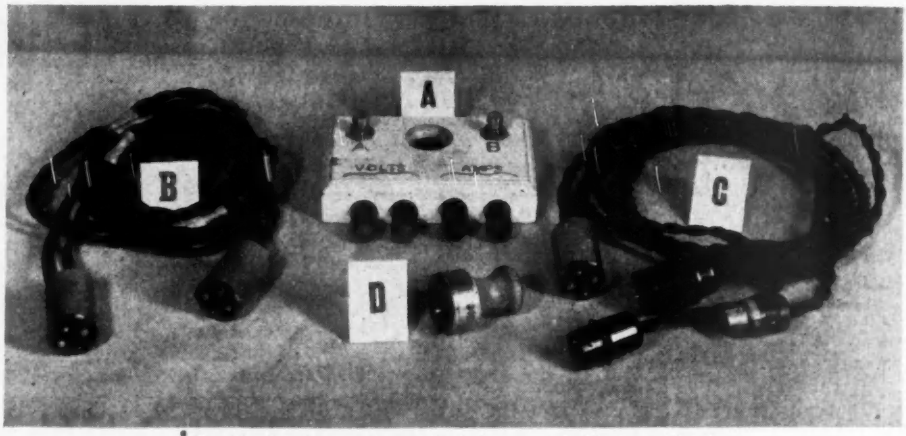


Fig. 12. Testing equipment including switch block and leads

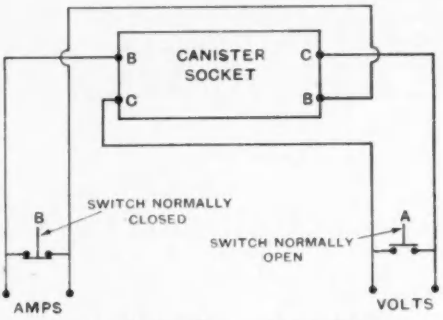


Fig. 13. Wiring diagram of switch block

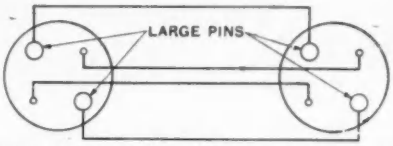


Fig. 14. Wiring diagram of canister type test lead

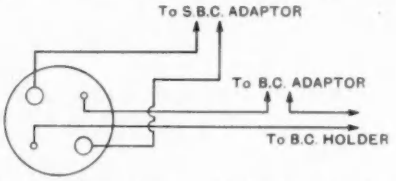


Fig. 15. Wiring diagram of test lead for S.B.C. glow starter

accessories include BC adaptors and bipin caps (12D) short-circuited, for inserting in place of lamps.

To measure the operating characteristics of say, a 40W lamp, the starter switch is removed from the fitting and replaced by the flexible lead. The normally-open press-button "A" then acts as a manual starter; "B", which is normally closed, shunts the ammeter and must be depressed when current readings are required.

After striking the lamp, by depressing the push-button and releasing after about two seconds, the voltmeter will register the actual volts across the lamps. With an ammeter connected to the appropriate terminals depress "B" and the running current can be measured. If the starting current is required, "B" is depressed at the same time as "A."

For an 80W lamp the procedure is the same, using the bayonet adaptor leads. The B.C. holder in the fitting is removed from one end of the lamp, and replaced by the adaptor while the B.C. holder on the lead is placed on the end of the lamp. The S.B.C. adaptor replaces the starter switch. As a B.C. adaptor can be connected in two ways, the test adaptor should be reversed if no running current is indicated.

A more convenient form than this "lash-up" arrangement is shown in Fig. 16. This is a testing set specially designed for the job, and includes a volts-amps change-over switch so that a universal (testing meter set) may be used in place of a separate voltmeter and ammeter, without continual re-connection. In addition it has several different types of starter sockets appropriately connected so that starters may be tested without continually climbing up and down ladders to the fitting itself. The leads for use with this compact set are fitted with 4-pin plugs at the instrument end (see Figs. 17 and 18) and extension leads are provided.

Operating Characteristics

The approximate current and voltage values which should be obtained with normal circuit arrangements are given in Table 4 which will help to locate faults due to low mains voltage; low lamp current due to incorrect gear; or the starter switch giving faulty operation.

TABLE 4
Current values for various circuits for 200/250 V with the correct choke for the actual voltage.

Lamp	Approx. Currents		Lamp volts
	Starting	Running	
8 ft 125W	1·3	0·9	170
5 ft 80W	1·3	0·85	106
4 ft 40W	0·7	0·41	108
3 ft 30W	0·5	0·34	103
2 ft 40W	1·3	0·85	50
2 ft 20W	0·5	0·35	64
18 in. 15W	0·5	0·3	56

NOTE.—In the case of series circuits on 2 ft and 18 in. lamps, readings should be taken for each lamp. The above results apply to inductive circuits (except for the 8 ft lamp). Where capacity control is used, the starting current is approximately the same as the running current.

Short-Circuit Checks

Where a lamp has failed due to excessive current, it is inadvisable to install a new lamp until the circuit has been checked. The most convenient way of doing this is by a short-circuit check. In this, the lampholders are short circuited by adaptors of the appropriate type, either bi-pin or bayonet, and the short circuit current of the choke coil and the voltage across the starter are measured. Values of short circuit current are shown in Table 5.

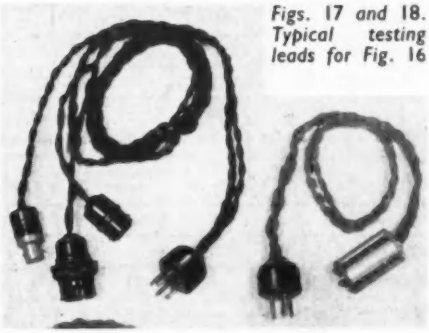
TABLE 5
Approximate short circuit currents for various lamp circuits.

Circuit	Current (amps)
8 ft 125W	1·6
5 ft 80W	1·6
4 ft 40W	0·8
3 ft 30W	0·8
2 ft 40W (two in series)	1·6
2 ft 20W (two in series)	0·8
2 ft 20W	0·5
18 in. 15W (two in series) ...	0·8
18 in. 15W	0·5

If these figures are materially exceeded, there is probably a fault in the choke coil or an earth on the wiring. If the voltage across the starting switch is higher than the mains voltage, the p.f. correction capacitor is connected across the lamp and not across the mains. This may lead to resonance and destruction of the lamp.

If, however, there is no reading on the voltmeter it suggests either a break in the fitting wiring or a broken lamp filament.

Fig. 16. Improved design of testing set



Figs. 17 and 18. Typical testing leads for Fig. 16

Conclusion

Faults which might arise in fluorescent lamp installations have been dealt with in some detail, as have their probable causes, symptoms by which each fault may be recognised and suggestions for their rectification.

It is emphasised that lighting failures will not occur more frequently with fluorescent lamps than with filament lamps, but with the latter there is usually only one cause, whereas with fluorescent lamps there may be one of several.

If, however, adequate testing gear is available and maintenance is reduced to a simple routine a great deal of time can be saved. The customer will then have a quick and efficient service and will be able to enjoy the benefits of fluorescent lighting.

APPENDIX

TABLE 6 — Starter Switches for Use with Different Sizes of Lamps

Lamp	Mains Volts	Type of Starter
125 W (capacitive)	200/250	Thermal (with internal resistor)
80 W	200/220 AC 230/250 AC 200/250 DC	200/220 Glow 230/250 Glow } or thermal Thermal
40 W	200/220 AC 230/250 AC 200/250 DC	200/220 Glow 230/250 Glow } or thermal Thermal
30 W	200/220 AC 230/250 AC 200/250 DC	200/220 Glow 230/250 Glow } or thermal air break Thermal air break
40 W 3 ft.	200/250 AC 200/230 DC 100/130 AC 100/130 DC	Each lamp has one thermal starter Thermal (glass)
20 W	200/250 AC 200/250 DC 100/130 AC 100/130 DC	Each lamp has one thermal air break starter Thermal air break
15 W	200/250 AC 200/250 DC 100/130 AC 100/130 DC	Each lamp has one thermal air break starter Thermal air break

TABLE 7 — Rating of Choke Coils for 40 W and 80 W Twin Lamp Circuits

Mains Voltage	Inductive Circuit	Capacitive Circuit
200/210	200/210	240/250
210/220	210/220	230/240
220/230	220/230	220/230
230/240	230/240	210/220
240/250	240/250	200/210

TABLE 8 — Capacitors for Power Factor Correction

Mains Volts	Lamp	Circuit	Capacity in mfd	Approx. P.F.
200/210	8 ft, 125 W	Single	20	0.9
220/230	,, ,,	,,	15	0.9
240/250	,, ,,	,,	15	0.95
200/210	8 ft, 75 W	,,	10	0.9
220/230	,, ,,	,,	7.5	0.85
240/250	,, ,,	,,	7.5	0.9
200/250	8 ft, 70 W	,,	15	0.9
200/250	8 ft, 50 W	,,	10	0.9
200/250	5 ft, 80 W	,,	7.5	0.85
200/250	4 ft, 40 W	,,	3.25	0.85
200/250	3 ft, 30 W	,,	3.25	0.85
200/250	2 ft, 40 W	Two-in-series	7.5	0.85
200/250	2 ft, 20 W	,,	3.25	0.85
200/250	,, ,,	Single	4.5	0.85
105/120	,, ,,	,,	5	0.85
200/250	1½ ft, 15 W	Two-in-series	3.25	8.85
200/250	,, ,,	Single	4.5	0.85
105/120	,, ,,	,,	5	0.85

TABLE 9—Series Capacitors for Capacitive Circuits

Mains Volts	Lamp	Circuit	Capacity in mfd	Approx. P.F.
200/250	8 ft, 125 W	Single	7	0.5 ldg.
,,	5 ft, 80 W	,,	7	,,
,,	4 ft, 40 W	,,	3.25	,,
,,	3 ft, 30 W	,,	2.7	,,
,,	2 ft, 40 W	Two-in-series	7	,,
,,	2 ft, 20 W	,,	3.25	,,
,,	,, ,,	Single	2.7	,,
,,	1½ ft, 15 W	Two-in-series	2.7	,,
,,	,, ,,	Single	2.7	,,

TABLE 10 — Gear Losses in Various Lamp Circuits

Lamp	Voltage Range	Circuit	Choke Consumption (Watts)
8 ft, 125 W	200/250	Single	35
8 ft, 75 W	,,	,,	—
8 ft, 70 W	,,	,,	20
8 ft, 50 W	,,	,,	—
5 ft, 80 W	,,	,,	20
4 ft, 40 W	,,	,,	10
3 ft, 30 W	,,	,,	7
2 ft, 40 W	,,	Two-in-series	20
2 ft, 40 W	100/130	Single	10
2 ft, 20 W	,,	,,	5
2 ft, 20 W	200/250	,,	10
2 ft, 20 W	,,	Two-in-series	10
1½ ft, 15 W	,,	,,	7
1½ ft, 15 W	,,	Single	10
1½ ft, 15 W	100/130	,,	5

Our readers' views . . .

Load Shedding

YOUR issue of February 15th gave a letter from F. D. Taylor of Deptford, suggesting broadly that a ban on radio and television sets during peak hours would considerably assist the supply industry's maximum demand problems.

I wonder if your readers are fully aware of the economies actually being effected now by wired broadcasting systems? Approximately ten per cent. of the radio licence holders in U.K. listen to their radio programmes by wired systems. During a typical day this week, one of the systems under my charge supplied 4,400 subscribers from amplifier equipment which consumed approx. 80 units. The maximum demand of the amplifier equipment, which operated for 18 hours during the day in question, was 5·3 kW. Four alternative programmes were provided and there was, of course, no consumption of electricity in the subscribers' houses.

You will see from the above figures that a wired broadcasting system can and does reduce the radio listening maximum demand to something approaching a fiftieth of its normal value, in addition to giving a substantial fuel saving.

John Goodwin
B.Sc.Tech., A.M.I.E.E.
Chief Engineer
REDIFFUSION (NORTH WEST) LTD.

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Rural Reclosers, Lock-out or Lock-in

I FEEL that the interest roused by Meteor's welcome reference to American reclosers in your issue of February 22, may be unnecessarily dampened by his concluding remarks.

The adoption of American type reclosers to British distribution systems is at present being actively pursued by at least one Area Board, largely as a result of the B.E.A. Productivity Team's visit to the States. These reclosers which, incidentally, are available in the States at from £40 per single phase unit, are quite suitable for operation on about 95% of the route mileage of 11 kV or lower voltage h.v. distribution lines in this country.

It is anticipated that a number of American reclosers will be in service on one Area Board's system this summer and extensive full scale tests are contemplated. At least four British switchgear manufacturers are engaged in the development of reclosers with the necessary high speed tripping characteristics to enable operation to take place quicker than that of h.v. fuses in the case of transient faults.

British h.v. fuses with the necessary slow speed characteristics and rupturing capacity are available and one manufacturer has produced a prototype tetrachloride fuse with suitable characteristics.

I would add that this type of recloser which is in general use in the States is entirely different in its function and characteristics from any automatic reclosers at present available in this country, and when considering their application, a considerable re-adjustment of normal ideas on protection is required.

Some confusion is apparent in Meteor's comments on the relative merits of "lock-in" and "lock-out" reclosers. The lock-out type of recloser, which, incidentally, does provide for the operation of fuses on persistent faults, is by far the most widely used type in the States and it would appear that it would be more suitable for British systems.

R. Mallet
B.A., A.M.I.E.E.
Deputy Chief Engineer
MIDLANDS ELECTRICITY BOARD

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Engineers Wanted

THE explanation of the deficiency of numbers of graduate engineers surely does not depend so much on the upward revision of the Burnham salary scales as suggested in Meteor's note in the March 1 issue, as the very wide diversity offered between the salary scales advertised in say *The British Dental Journal* L.D.S., graduate £1,500 p.a., against your current Journal's offers from the B.E.A., for B.Sc. (Eng.) engineers, £500 p.a.

In these tough days a large number of parents and, of course, students, have to consider what the electricity industry has to offer them when their training is completed and it might, I suggest, be a good thing to look into the situation in all training establishments and see where the grey matter is heading?

"Milliamp"
ISLE OF WIGHT

Design Lectures for Appliance Salesmen

ELECTRICAL salesmen from leading London department stores, including Harrods Ltd., the John Lewis Group, John Barker, Selfridge's, Druce and the Bon Marché made up the audience at a lecture on domestic appliances given by Mr. W. F. Lorch at the Mount Street premises of Falk Stadelmann and Co. Ltd.

Underlying theme of the lecture was the necessity for sales staffs to be thoroughly conversant with the pros and cons of the ever-increasing range of domestic appliances. The increasing complexity of modern appliances brought with it a necessity for increased knowledge of the capabilities and limitations of any given style of apparatus so that the customer obtained maximum satisfaction not only in value for money at time of purchase but in service obtained. A simple and fairly obvious example of this was the electric kettle. Not everybody was prepared to pay for maximum refinement, but it would be short-sighted policy to recommend, for example, aluminium for use in districts where the water caused corrosion, or mica elements in areas of very high water hardness. In the same way, it was just as foolish to attempt to sell an expensive mixer for cream whipping as it was to supply a low-powered model for heavy work.

Another matter on which guidance was given was the handling of complaints. It was very bad practice to treat complaints too lightly, but it was also important to recognise faults arising from such diverse causes as low supply voltage, actual misuse, or some extraneous cause. It was, for example, easier to say that a non-thermostatic iron could not cause radio interference rather than track the trouble down to an arcing plug socket or a loose connection.

Manufacturers of major appliances, said Mr. Lorch, usually took care to ensure that sales staffs knew all about their product. Minor appliances had been more neglected, however. There was a tendency to regard them as something sold over the counter, plugged in and forgotten. As a designer he felt that it was high time that this outlook was remedied by manufacturers. The present lecture was an experiment which, if successful, would be repeated in other parts of the country, not only to department stores, but to electrical dealers and contractors.

Supply Ministry to Open Atom School

AN atomic energy school to teach workers in industrial and medical laboratories how to use radio-active materials is to be set up at the Atomic Energy Research Establishment at Harwell. The first course, lasting six weeks, begins on April 2, and will be in charge of Dr. J. E. Johnston, of Harwell's Isotope Division. The school has been set up because the rapid increase in the use of British radio-isotopes has led to a widespread demand for further education in their uses.

Many prospective users have an exaggerated idea of the equipment needed to use radio-active materials as tracer substances. The school will show how comparatively simple equipment and layouts can be used, if proper precautions are taken.

It will give students of graduate level detailed instruction in the fundamental, practical and theoretical problems encountered when radio-active materials are used in the quantities employed in a normal laboratory.

Students will be taught how to measure radio-activity with a geiger counter and scaler, and how to use scintillation counters, ionisation chambers and photographic methods for radiography and radio-autography. The experiments they will carry out will give them ample experience of the methods of radiochemistry. The school will give a broad outline of the principles of nuclear physics, the principles of the electronic circuits used in measurement and the hazards and biological effects of radio-active materials.

Twelve students will be accepted on each course, which, after the first, will last for four weeks. The second and third courses are scheduled to begin on May 15 and June 18. There will be from 12 to 18 lectures in the course, each given by a specialist from Harwell. The syllabus will be varied slightly to meet the needs of the majority of students present. Fee for the course will be £40.

Further particulars of the school are available from Dr. J. E. Johnston, Isotope Division, A.E.R.E., Harwell, Berks.

SUPPLY HANDBOOK—1951

An up-to-date list of personnel of the British Electricity Authority, the Divisions and Boards, etc., is given in the 1951 edition of the "Electricity Supply Handbook," just published, price 3s. 6d., plus 3d. postage. It includes data of the number of consumers, etc., and revised maps of the Board's areas. Copies are available from these offices.

Motor Control Gear

B.E.A.M.A. promotes Open Discussion on the Anglo-American Productivity Report

DIRECT-ON-LINE motor starting was the subject uppermost in the minds of the majority attending the open meeting sponsored by B.E.A.M.A., on Tuesday of last week, to discuss the report of the Anglo-American Productivity Team on motor control gear, and to meet the members of the team. MR. E. C. HOLROYDE (Vice-Chairman, Crompton Parkinson Ltd.), presided.

The report, first reviewed in the ELECTRICAL TIMES, for Oct. 5, 1950, p. 533, was formally presented by MR. J. R. WALTON (Managing Director, Electrical Apparatus Co. Ltd.) who, it will be recalled, led the team. Emphasising the need for extended use of direct-on starting, he put forward a plea for motor manufacturers to limit the standstill current of induction motors to about six times full load. Regarding the production of British starters, he instanced his own firm's output which, he said, approximated 76% direct-on, 14½% star-delta, ½% auto transformer and 9% slipring units.

From the body of the hall, the discussion was opened by MR. J. O. KNOWLES (chairman, Brookhirst Switchgear Ltd.), who pointed out that the report contained little that was absolutely new, but presented a most valuable collection of information. He pointed out that there were British firms having an output of two starters per minute —there could be little wrong with their production methods.

A point which had been raised in the report was the use of sheet-steel cases. He was convinced that very few British customers would accept the American "general purposes" case. Where the American manufacturer scored was the willingness of his customers to accept standard lines, and this was greatly assisted by the size of the country —a buyer could not conveniently travel 3,000 miles just to drop in on a manufacturer and design his product for him.

On the question of direct-on starting, he pointed out that one great reason for non-popularity of the star-delta starter in the U.S. was that the distribution system was more usually unearthed.

Direct-on Starting

Several members, during the course of the discussion, referred to the apparent lack of co-ordination between maximum currents from the standpoint of the control gear manufacturer and the motor designer. While the standard contactor was normally assumed suitable for about six times full load current at switching on, the standstill currents of motors often tended to be higher than this and figures of 8, 10, 11 and 12 times F.L. were quoted as being not unusual. This, of course, necessitated a larger size of contactor than would otherwise be necessary, as well as other even more serious inconveniences. It was often found that with these very high standstill currents, it might be necessary to use larger cables, and heavier fuses for back-up protection.

It was also pointed out that N.E.M.A. in the U.S. seemed to have managed to produce the answer to this problem of corelation, having specified a standard figure of six times F.L., which simplified all problems regarding starter, cables, and back-up protection and it seemed a pity that something could not be done in Britain on the same lines. While it was felt that it was asking a little too much to suggest that motors should be tailored to starters, opinion was expressed that motor designers were a law to themselves.

On behalf of the motor manufacturer it was pointed out that these high standstill currents were often the result of the customer laying down conditions which were really unnecessary, and that the first step in the direction of simplifying the whole problem was for the motor manufacturer to educate his customer.

Viewpoint of Supply

The supply authority's viewpoint on direct-on starting was put by MR. H. J. GIBSON (chief commercial officer, Midlands Electricity Board). On e.h.t. systems, he pointed out that no restrictions existed—except those imposed by the I.E.E. Regulations. On low-voltage networks we were admittedly in a less happy position than the U.S. and in many areas low capacity in both transformers and network cables was a considerable handicap. The entire problem, in fact, hinged on the question of reinforcement of L.V. networks where necessary.

There was in existence a committee appointed for the sole purpose of ironing out some of the discrepancies existing in present motor-starting regulations, and all Area Boards were represented. The committee was very much alive to the problem they had to tackle, and a great deal might happen in a shorter time than most people imagined.

Pointing out that this report was only a part of the general picture of production efficiency, COL. B. H. LEESON (director, B.E.A.M.A.) said that it was interesting to see how the part fitted in with the whole, and this could best be done by examining the statistics of the industry. Even allowing for price increases, production had increased tremendously from £310 million in 1946 to £470 million in 1948, the output per person

employed rising from £705 to £975 during the same period, which could only point to increased production and better methods. This was not an invitation to rest on our laurels, but it was, nevertheless, encouraging.

Comparisons with the U.S. often lost sight of the fact that our export market was very much larger, and exponents of standardisation often overlooked the fact that one of the chief reasons for our large export market was our ability and willingness to make what was required. Electrical exports totalling £23 million before the war accounted for £140 million in 1949 and £160 million in 1950. With 2½% of the total employed persons in the country, the electrical manufacturing industry produced 5% of the national wealth —a fair proof that the industry was efficient.

Following a reply by the leader of the team, a number of resolutions were passed by the meeting. In addition to formal acceptance of the Report, and a request to the B.E.A. for assistance in the widening of the scope of direct-on starters, the attention of the I.E.E. was drawn to "the clear guidance afforded to installation engineers on the selection of cable sizes and cable protective devices by the National Electric Code approved by the American Standards Association and the implicit recognition therein of the circumstances arising from the use of direct switched squirrel-cage motors."

Three resolutions passed related to the B.S.I., whose attention was drawn to (1) American fuse specifications prescribing carrying capacity and maximum blowing times, thus facilitating co-ordination of cable sizes and back-up protection; (2) the U.S. system of classifying motors according to standstill currents; (3) American practice regarding the testing of motor control gear and small air-break switch gear.

BRITISH CABLES FOR CANADA

TWO Canadian electricity supply authorities will this year install 115 kV and 120 kV compression cables which are now being manufactured in Britain by Enfield Cables Ltd. Together, the value of these two installations amounts to more than $1,000,000, both existing compression cable designs—pipeline and self-contained—being involved.

The smaller of these two contracts, from the Hydro-Electric Power Commission of Ontario, is for the supply and installation of a 115 kV 3-core pipeline compression cable to carry a full load of 125 MVA with 100% load factor. The cable will run for the most part along Fleet Street and Keating Street in the city of Toronto itself, between Don Fleet Junction and the Toronto Esplanade terminal station, a route length of some 6,000 ft.

In this cable, the conductor is 1,000,000 circular mils (91/·105) oval section screened with carbon papers. The impregnated paper insulation is 0·32 in. thick, and the reinforced diaphragm lead sheath is 0·08 in. thick. Skid wires to facilitate pulling are applied to each core before laying up, the three oval cores being laid up together and drawn into a steel pipeline. Single-core self-contained compression cable of the same conductor size with an outer pressure-retaining sheath, reinforced both circumferentially and longitudinally and protected against corrosion by Enfield's patented rubber sandwich, will be used for the tails for terminating the pipeline cable. For this job, seven straight-through joints, two trifurcating joints, six sealing ends with semi-conducting glaze are being supplied by Taylor Tunnicliff and Co. Ltd. The actual installation work will be carried out by Henry Ihle, Inc., of Flushing, New York, N.Y., but Enfield Cables are sending engineering personnel from England to supervise the work, the consulting engineer for the project being our old friend Mr. Harold Hobson, formerly of C.E.B. fame.

The Commission has decided to lay a second steel pipeline in one continuous length in the same trench with the first cable to save future excavations, the cable to be pulled in subsequently when load conditions demand. This spare pipe will be charged and maintained with gas at low pressure.

The second, and larger, contract, from the Quebec Hydro-Electric Commission, is for the supply only of some 100,000 ft of 120 kV single-core self-contained compression cable, to be laid four cables in parallel, one 3-phase circuit plus a spare cable over a route length of 25,000 ft, part of which includes a bridge crossing over the St. Lawrence river. On this job, the conductor is 850,000 cm. (91/·097) for the land cable and 650,000 cm. (61/·103) for the bridge section, oval section screened with carbon papers. There is a circular pressure-retaining sheath, 0·10 in. thick, with circumferential and longitudinal reinforcements, over-all protection being by means of Enfield's patent sandwich finish.

For the land sections on either side of the bridge the cables will be pulled into transite ducts, but on the bridge they will be in transite trays. The installation and the maintenance of these cables will, owing to local conditions, present difficulties, some of which can only be solved in situ. Extremes of temperature will be considerable (−29° F to + 95° F) and constant vibration caused by traffic may result in fatigue and ultimate failure of the lead sheaths, so the experiment will be closely watched. Both these cable installations—the orders for which were obtained by Enfield's against intense competition—are to be ready for service before the 1951 winter.

Notes on Wiring
by MEGOHM

Tariffs and Wiring

A Standard Tariff Pattern is Long Overdue

SOME six months ago I discussed on this page the question of tariffs, as in the long run they are one of the most important items which the engineer should consider when planning a wiring installation. I then expressed the hope that the various Area Boards would get down to the task of formulating a simple set of tariffs, based on a standard general pattern, but so far as I can see, this desirable state of affairs is still a long way off.

As the parent body, the B.E.A., has now published its tariff for the year 1951 it seems an opportune moment to return to this important subject once more.

Area Boards and B.E.A.

Without claiming any inside information on the matter, I surmise that the political element has some bearing on the question. Some of the Area Boards no doubt inherited several hundred various tariffs from the former undertakers and any unification of these would, no doubt, penalise some consumers and benefit others.

As the Area Boards operate as separate units, the tariffs ultimately fixed will, no doubt, vary from district to district; but that is no reason why they should not follow some definite pattern which they most certainly do not do at present. The B.E.A. tariff at which energy is sold to the Area Boards is a plain M.D. tariff, £4 2s. 6d. per kW (not kVA) of M.D., 0·33d. per unit ± 0·0007d. per penny above or below 38s. per ton of coal. In passing, it may be remarked that the price of coal varies for the different areas from approximately 40s. to 62s. per ton, and makes ludicrous an agreement still running in which the coal clause variation is based on 12s. per ton.

M.D. Tariff Required

As the B.E.A. is thus following in the steps of the C.E.B. in continuing the M.D. pattern of tariff it seems logical to assume that this form of tariff should be universally available to all consumers.

So far as my experience goes M.D. tariffs are available in most of the provinces, but not in many parts of London. I entirely fail to see any logical reason for this, and the nearest standard tariff based on the installed load is, in many instances, a very poor substitute indeed.

With most large modern installations having p.i. cables or solid busbar systems for mains and sub-mains, it is safe to say that the life of this part of the wiring will be many years indeed. But as either method is very costly to install, it follows that one must decide once and for all whether to separate the various types of load or whether an acceptable all-in tariff will be available for some considerable time to come.

Mains and Sub-mains

In an ordinary type of building, fairly compact, and consisting of a number of floors, the difficulty is not too great and the length of the rising main will usually not exceed 40-50 yds or so. Here it may even be a convenience to have two or three sets of risers, for the premises may at some time be occupied by a number of consumers with varying requirements, also introducing "landlords" circuits for staircase lighting and lifts, etc.

The more difficult problem is where a number of buildings are scattered over a large site, and are to be metered and fed from one main switchroom. In most cases the mains are then laid direct in the ground, or may be placed in a trench containing the central heating pipes. The alternative, and rather a poor one, is to string them overhead from building to building.

I would therefore suggest that to simplify our main wiring all Area Boards should offer a plain M.D. tariff available to all, wherever and whomsoever they may be, and furthermore, that in the event of a consumer wishing to adopt separate tariffs, then they should be willing to provide the necessary check-meters or sub-meters to enable this to be done.

If, say, twenty or thirty meters can be read for separate consumers in any one building, why cannot the same number be read for one consumer? After all, the rental charged for meters represents a not inconsiderable income to the undertaker, in fact, it pays the cost of reading the meters.

CALORIE AND CURRENT

Use of Thermal Effects in Electrical Measurements discussed at I.E.E. Meeting

MOST calorimetric work has no very high accuracy. This quotation from a Royal Society memorandum by Sir Charles Darwin revealed the underlying reason for a discussion on "Electrical Measurement by Thermal Effects," which took place at an Institution of Electrical Engineers Measurements section meeting held last week. In it speakers gave close attention to maintaining the very high accuracy possible with purely electrical measurements in the field where such measurements join with the determination of thermal quantities.

An example of the lines which the discussion followed is given by the consideration of electrical machine and transformer stampings. Dr. L. G. A. Sims, one of the three opening speakers, took the point that an uncertainty or variation may be considered noteworthy if it reaches 0·1%. The specific heat of machine and transformer stampings does not seem to be known publicly at all, but on test it is found to be at least 20% higher than that of pure iron, with a change of about 0·1% per degree centigrade and 1% per/mil of ferric oxide scale. Corresponding changes for specific resistance values in iron are greater, being 0·6% per degree centigrade at 20° C. These measurements for stampings are based on a 14 mil 4% silicon-steel sample.

Iron Losses

After discussing variations in the mechanical equivalent of heat, Dr. Sims went on to suggest that the application of thermocouples to air-cooled packs of iron stampings can give results in terms of electrical loss with an accuracy certainly comparable with that obtainable by complicated calorimetry. Moreover, the transfer principle can be applied to such an air-cooled pack, though this must slow down measurements. With the possibility of measuring very small temperature rises, of the order of 0·01° C, cooling losses can be eliminated by determination of the initial rate of temperature rise. The method has been used to ascertain the losses at points in the stator iron of large turbo-alternators.

In the discussion that followed the opening remarks, several speakers referred to the lack of information on losses in magnetic materials at inductions of the order of 18 or 20 kilogauss, which were common in alternator design. Several methods were suggested for segregating the heat energies developed in the copper exciting windings and the iron.

Thermocouples

Dr. J. G. Freeman, another opening speaker, discussed the calculation of electrical input to a body by measurement of its temperature, and the effect on such calculation of the variation in temperature between different points in the body at any given instant. Considering the differential equation for heat input, temperature and time in the case of a body of uniform temperature, it is possible to determine the required value by measurements of the temperature at one point. However, the temperature is not usually uniform. To check whether the variation could be ignored, a coil was made having a number of thermocouples built-in. Taking the various points in turn, the electrical input was calculated on the assumption that the temperature was uniform; the results obtained varied in error between −45% and +35%, showing that ignoring the temperature distribution might lead to large errors.

In the general discussion, it was pointed out that the distribution of heat generation in iron specimens might vary widely with the flux density: this factor should be taken into account in any calculations based on the use of distributed thermocouples. Much useful information was exchanged on techniques of applying thermocouples. At best, a thermocouple can only measure its own temperature, and so in surface temperature measurements accuracy depends on good thermal contact, and also on the preservation of the normal heat emissivity of the surface. The thinnest of air films produces a considerable temperature drop, and emissivity is seriously reduced by some varnishes which are opaque to infra-red radiation. In regions of steep temperature gradient the homogenity of connecting wires may prove an important factor, while spurious e.m.f.s may also arise from strains.

Professor J. Greig, the other opening speaker, dealt with what he described as "conventional calorimetry," and gave special attention to its use in relationship to v.h.f. measurements.

Problems and Practice

IN ENGINEERING

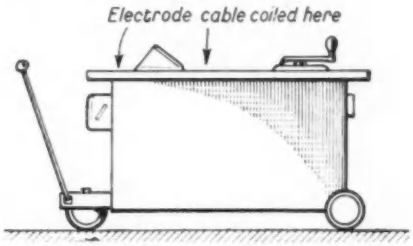
Intermittent Shocks

THE proprietor of a small shop complained of spasmodic shocks over a period of weeks. It appeared that various metal rails and fittings were becoming charged at odd moments and giving shocks, which were not, however, very strong. Megger insulation tests were made on all circuits and no apparent leakage was discovered. Current was switched on again and no shocks were experienced as before, so it was decided to await events. Two or three days later, shocks were reported, and tests were again made, without apparent leakage showing. It was decided to test each individual outlet and appliance, and this showed up a low reading on the hoist circuit. This hoist was of an early type, powered by a d.c. motor controlled by a reversible starting resistance. This resistance was housed in a box, lying with the studs uppermost, the resistance arm being controlled by a steel rod which ran vertically up to the ground and first floors. The motor, resistance, etc., were housed in the basement, the hoist being employed to transport loads between the two floors. Turning the arm to the left decreased the resistance for "up" travel, and turning the handle to the right decreased the resistance for "down" travel. Tests with an ohmeter showed a series of low readings to earth from the various studs. This was caused by the worn condition of these studs and the fact that the resistance arm carried a carbon block which rubbed along these studs, so that carbon dust was sprayed upon the slate panel, due to arcing. This carbon combined with occasional dampness due to the condition of the basement, provided a leakage path to the frame of the box, particularly in the case of the third stud of the "up" resistance which showed a very low earth reading.

Test on the earth resistance of the metal frame showed a value higher than that of the leakage path, due to the state of the earth connection. Thus, when the lift was used a certain amount of current leaked to the frame, and since the existing earth conductor was of high resistance the current took various paths of metal to earth, and accounted for the occasional shocks experienced only when the hoist was being used. The starter was dismantled, overhauled and cleaned, studs were aligned evenly, and a covering for the starter to prevent ingress of moisture was arranged. The earthing was renewed and no further shocks were experienced.—*J. T. R.*

Welding Set Ammeter Overheated

IT is not always appreciated that, under certain conditions, serious heating can occur in a.c. circuits due to eddy currents being induced in adjacent metal work.



Position of cable on portable welding set

Such a case occurred with a portable a.c. welding set, the ammeter of which became overheated. The construction of the set was roughly as shown in the accompanying sketch, which shows a cast-iron ammeter case projecting from the top of the set.

It was found that about 12 turns of the welding electrode cable were coiled fairly closely around this ammeter case and lying on the top of the set. Since the welding current in this cable was around 300 amps, it was clear that heavy currents were being induced in the ammeter case.

It is not surprising that the welder stated that the set was working much better after the overheated ammeter had been repaired.—*A. C.*

Moving Stator

AN f.h.p. fan motor giving trouble was stripped down. It was found that one of the interior leads had been worn through by rubbing on the shaft. The motor was reassembled so that the leads from the stator were opposite the connecting studs, and the leads cut as short as possible to avert further trouble. The motor was replaced (about a three-hour job) and, except for slight rubbing on the sides of the trunking, ran perfectly.

About a quarter of an hour later, when I

was packed up ready to go, it was noticed that the fan was running much slower than normally. It was found to be single-phasing. Tests proved that the trouble lay in the motor again. When the motor was reopened it was noticed that the stator had turned around in the casing, dragging the internal leads tightly against the shaft where they had quickly worn through.

Examination showed that the stator should have been held by two $\frac{1}{16}$ in. Allan pins, but only one of these had been holding it, despite the fact that the both had been cemented up.—*E. Alus.*

Alternator Field Suppression

EXPERIENCE has generally shown that failure of the rotor circuit is uncommon and protective equipment to take care of such a condition is unusual. If the field circuit of an alternator running in parallel with others is inadvertently opened, the alternator will continue to run as an induction generator, when the speed will rise above synchronism to a point of balance between load and turbine governor characteristics. Since excitation is from the main busbars, being obtained from the other alternators, the output is at normal frequency and will help to some extent in supplying energy to the system. If the faulty alternator has only a small load and the remaining sets have greater excitation, it is quite probable that it will remain in step and maintain almost its original output. If there is sufficient fully excited plant running to supply the necessary excitation current, there will be little disturbance on the system.

Normally no damage will be done to the faulty alternator even if it is allowed to remain on the system, and since, in this event, it does not greatly increase the liability to disturbance on the system, protective equipment is not essential. Under loss of field it would appear that it is possible to cause damage to the windings, rotating parts, and maybe the machine foundations. Automatic field suppression equipment is included to prevent further damage to the alternator by suppressing the alternator field as soon as possible after an internal fault has been detected by the circulating current protective gear and the alternator disconnected from the system. Should the field suppression switch be inadvertently opened it is usual to arrange for the main circuit breaker to be automatically opened in such circumstances. The field suppression switch is arranged to be operated only from the circulating current or the restricted earth leakage relay (the latter form of protection is quite often used on the smaller machines) and not from the standby overcurrent relay. This is no doubt the most effective method as it is rapid in action and is therefore generally recognised as the most satisfactory.

There are numerous alternative methods of suppressing an alternator field and the machine manufacturers should always be consulted. Some of these are: (1) Automatic air circuit-breaker in field circuit which is opened as already mentioned. (2) Automatic air circuit-breaker acting as a rotor slip-ring short circuiting-switch. (3) Either of the above with the addition of an auxiliary switch for inserting a discharge resistance across the main exciter field windings.

Tests made on alternators differ, but complete collapse of the magnetic field in 0·2 second is possible when the rotor field is open-circuited. Times up to 15 seconds have been recorded for the collapse of magnetic fields to normal value. These tests are for a solid rotor core, the low maximum voltage being due to the damping in the solid metal. The peak voltage obtained with a given discharge resistance connected across the field circuit can be estimated as follows:

$$Vp = \frac{V\,(r+R)}{r}$$

where V is the applied voltage; Vp the peak voltage; r the field circuit resistance and R the discharge resistance. The opening of the main field circuit by a single or double switch without the use of a discharge resistance gives the most rapid discharge of the field and therefore provides better protection. With solid rotors it is quite safe and is to be preferred. Before applying it to laminated or built-up plate rotors it is always advisable to ascertain that the inductive voltage-rise when the field circuit is broken is within the value of the rotor insulation breakdown test voltage. A slip-ring short-circuiting switch is sometimes preferred, and as the main exciter armature is short-circuited, it is necessary to insert a "loading" resistance in the armature circuit to prevent sparking at the commutator. With modern alternators there is no necessity to ensure a definite sequence in the order of opening the main circuit-breaker and the field air circuit-breaker. The essential feature is that the rotor field be broken or opened as rapidly as possible when a fault develops. The field suppression switch also affords protection to the rotor field windings.—*C. B. Y.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

ENGINEERING SINCE 1851

FORTHRIGHT claims for the advances of British engineering during the last century were made by MR. W. T. O'DEA, B.SC., M.I.E.E. (Science Museum, South Kensington), in a paper read before the Royal Society of Arts last week. He stated that his historical review had four main themes—that, contrary to popular belief, engineering has increased the skill that is required of the worker; that it has removed much of the unpleasant manual labour from industrial processes; that the machine has created employment and has raised standards of living; and, finally, that failure to use machinery to the maximum advantage imperils those standards.

Much of Mr. O'Dea's review concerned the state of engineering at the time of the exhibition, the progress made since took up the rest of his time. Some features of special interest to the electrical engineer may be selected from his overall story. Lighting provides a good example. In 1851, it was so primitive that no system was available to justify the opening of the Exhibition outside daylight hours of 10 a.m. to 6 p.m. At that time the electric arc was known in the comparative sense, but filament lamps were 30 years away.

Electric generation was practically applied in 1858, when an arc lamp at the South Foreland lighthouse was lit from a 3 h.p. generator. The result was an immediate quickening in the search for satisfactory means of applying electric power, and the well known pioneer names of the industry soon began to appear. Something of the difficulties that faced them may be gathered from the fact that vibration from contemporary high-speed steam engines driving generators was so bad that injunctions against operators were frequently sought in the Courts when stations were situated in populous districts.

Fittings for the Festival

EXTENDED showrooms for domestic lighting fittings have been completed recently at The Lighting Centre, Knightsbridge, S.W.1, and we were privileged to inspect them last week. The lighting units at present on show are representative of the range which Troughton and Young (Lighting) Ltd. are introducing to meet current trends in interior illumination.

Modulations of a theme based on the various conic sections were particularly noticeable in the collection and the idea was attractively repeated in some interesting variations with different kinds of material—metals, various natural and synthetic fabrics, and wood veneers. These fittings, as with all those shown, have been designed under the direction of Mr. A. B. Reid, R.D.I., A.R.C.A., F.S.I.A., with equal attention to both aesthetic and technical qualities.

A helpful feature of the showroom is the provision of a control consol, at which the visitor can select fittings which he wishes to see illuminated. A mimic diagram in the consol identifies the lamps alight by numbers, and so facilitates the comparison of particular designs.

Additional interest was added to the display by the fact that many of the fittings on view have been selected by the Council of Industrial Design as exhibits for the Festival of Britain, both at the South Bank and at other centres. Apart from these items and the large selection of designs included by photograph in the "Design Review" stock list, many hundreds of fittings have been selected by architects and designers for their various buildings in the South Bank scheme. As is standard practice with Troughton and Young, where necessary there has been collaboration between the architects concerned and the firm's designers to produce special fittings.

General view of the new showrooms at Knightsbridge

overseas news

San Fernando's Position

Although its own power station has had to revert to load-shedding, San Fernando does not propose to carry out any extensions, according to Councillor E. C. Crawford, the Mayor, but rather to wait for connection to Trinidad's island-wide electricity scheme, which is still a few years off, it seems. According to Mr. Crawford, the local Council could not economically add more plant, which, on current estimated needs, would cost over $500,000. Future hopes lay in obtaining from the Trinidad and Tobago Electricity Commission all current the town needs in excess of its own plant's output. There was no question of scrapping the power station now, the Mayor stated, nor was there any longer a chance of selling it to the Commission. Apparently the local undertaking is now operating at a loss of $4,000 a month. To keep losses to a minimum, the Council is taking steps to get the maximum possible income for present power production. This will involve revision of rates and installation of meters in the hundreds of homes where there are bridged circuits. A study is also being made of the financial implications of replanning the distribution system recommended some months ago by Mr. R. V. S. Aleong, then the town engineer, who is now Government electrical inspector. Latest news from the Commission is that their Southern transmission line is nearing completion.

Tobago Seeks Revision

The Tobago (West Indies) Chamber of Commerce is seeking an amendment to the Electricity (Inspection) Ordinance No. 44 of 1945, and the Electricity (Inspection Amendment) Ordinance No. 32 of 1950, under which officers of the Trinidad and Tobago Electricity Commission can carry out an inspection of private generating plants, and may order the disconnection of plants not wired to their satisfaction. According to reports, the view is widespread among owners of private plants there, that until Tobago is provided with a public electricity service, interference by the Commission is an effrontery.

Brisbane Reorganisation

Reorganisation of the Brisbane City Council electricity department was announced by the Lord Mayor at a special council meeting last month. Under the proposals, control of power houses will be transferred from the transport department to the electricity department. Chief engineers would head a generation section and a distribution section, and the sections would be dovetailed under the control of a general manager. It was an opportune time to make the major changes in the administration, for one high officer had resigned to take a new position, and another officer is to retire.

Clarence River Doubts

Clarence River Country Council, New South Wales, has now received intimation from the Canadian Overseas Engineering Constructors, that although the firms concerned greatly desired to be of assistance in the hydro development of the Clarence River, the serious world position which had developed made it impossible at the present time. Some months ago, the Council employed Mr. H. L. Vernon, an electrical engineer with experience in Tasmania, who was now investigating the upper regions above Nymboida scheme which were considered of vast potential power. The Council decided to give Mr. Vernon full scope, and await his recommendations. The Council's chief engineer, Mr. R. S. Rice, also reported that the possibility of obtaining output from the Koolkhan station this year was extremely remote.

Tully Falls

The State Government has approved a subsidy of £2,120,000 towards the construction of the Tully Falls hydro-electricity scheme, Queensland. Sections of the work to be subsidised include the diversion weir and intake works, the Koombooloomba Dam, substations and transmission lines, access roads, accommodation, surveys, and investigations. The Tully Falls Hydro-Electric Board is responsible to the Works Co-ordinator-General (Mr. J. R. Kemp) for the design and construction of the project. A temporary power station for the constructional work is being built.

Yeoman Service

Queensland's first electricity supply plant ceased to operate last month. It served the little township of Thargomindah, 730 miles west of Brisbane, and was established in 1895 by the Bulloo Shire Council. It was claimed to be the third power plant in Australia. Power was provided by a Pelton waterwheel driven by the flow from an artesian bore a mile from the township. Now, a new diesel generator has been installed to give an improved service.

Progress in W.A.

In Perth, Western Australia, the new power station at South Fremantle is steadily taking shape, and the hope that it will be generating power this winter seems likely to be fulfilled. All the major portions of the first 25,000 kW section are rapidly being completed and a start has been made in the erection of the "B" station of 50,000 kW. The 66 kV transmission line linking South Fremantle with the East Perth station, is also well in hand, conductors having been strung up on the towers for two-thirds of the distance.

Winnipeg's Expansion

In connection with the proposed extension of the Winnipeg City Council's steam generating station, a recommendation has now gone forward for the placing of a contract with Brown Boveri (Canada) Ltd., for the necessary plant. Value of the contract is placed at $707,810.

The other Winnipeg undertaking—the Winnipeg Electric Co. (which is to be expropriated under proposed legislation)—has almost simultaneously announced that it proposes to install a sixth 37,500 h.p. generating unit at its Seven Sisters hydro-electric station. This will complete the development of the Seven Sisters hydro site, about 60 miles north-east of Winnipeg, and bring the plant to its full-rated capacity of 225,000 h.p. The final unit is expected to be ready for operation in the fall of 1952.

Tobique Project

Good progress is reported on construction for the first stage of the Tobique River hydro-electric project of the New Brunswick Electric Power Commission, on which work began last September. The cofferdams have been completed for the first phase of dam construction and for the power house. The project is expected to proceed to plan and be completed by 1953.

Distribution Extension

The North Gujerat electric grid system was brought into operation by Bombay's Minister for Public Works, Dr. Jivraj Mehta, at Baroda a few days ago. The system will serve an area of about 2,400 square miles, power being supplied to major towns and to about 140 villages. The scheme is estimated to cost Rs 25.1 million. Expenditure of over Rs 8 million was incurred up to the end of 1950. When in full operation it is expected to yield annually over Rs 4.6 million.

Sets to be Purchased

A deputation from Vryburg, Bechuanaland, consisting of the Mayor, the deputy mayor and the town engineer, recently visited Cape Town for an interview with the provincial authorities, as a result of which permission has been given for the purchase of two 50 kW and one 75 kW generating plants.

Work at Bloemfontein

Preliminary work on the extension of the Bloemfontein power station is now well ahead. Foundations for the first cooling tower have been completed. The boiler plant is expected this month and the turbo-alternator to be erected in the present building should arrive in May. This is part of a £2,500,000 scheme to cater for the rapidly-expanding power consumption of the city. The installation of the first 7,500 kW turbo-alternator in May will step up the present output to 31,500 kW. The new turbo-alternator will be similar to the one brought into operation in the summer of last year.

New Zealand Railway Electrification

Announcing that the New Zealand Government had approved in principle proposals for the electrification of the North Island main trunk railway, Mr. Goosman has stated that the first section to be dealt with will be from Papakura to Frankton—the electrification of the Auckland-Papakura line has already been announced. The Minister said that electrification of the remaining section of the line from Frankton to Paekakariki would be deferred until completed details and estimates were available. There were in this length certain problems, largely of a civil engineering nature, which required proper study and report. Over this section, however, in the meantime a number of diesel electric locomotives would be used and orders for these were now being placed. Mr. Goosman said the problems associated with the electrification of the main trunk railway had been examined by two Swedish engineers, Messrs. Th. Thelander and Erik R. Edinius, who had confirmed the earlier proposals of the general manager of railways, Mr. F. W. Aickin. They were satisfied that complete electrification of the line was justified. Their report recommended that electrification should be carried out using the single-phase 16-2/3 cycles, 16,000 volts alternating current system, which was developed in Sweden and operated there satisfactorily for 35 years.

Line Extensions

With a view to extending its power lines to supply backblock settlers the Thames Valley Electric Power Board, New Zealand, proposes to make application to the Rural Reticulation Board for subsidies. The Power Board proposes to spend £30,000 between April 1 of this year and March 31, 1952, on this work. This is a portion of the £100,000 power-extension loan recently approved.

A Proposal

The New Plymouth Chamber of Commerce, New Zealand, is to amend and add to its report on the establishment of an oil-fired station for power generation at the port of New Plymouth in the North Island, and is to approach the City Council to get it placed directly before the Minister concerned.

Austrian Production

Considerable expansion during 1950 is reported by electrical manufacturers in Austria, although a shortage of raw materials is causing difficulties. In this direction the cable and electric wire manufacturers are chiefly hit, but last year saw the over-production of electric lamps as well as heating equipment, indicating a consumer resistance to this form of heating because of the high electricity charges. Elin A.G., one of the principal firms, have recently booked an order from Australia for 19 regulating transformers aggregating 80,000 kVA; two 12,000 kVA generators for the Near East, and a number of generators and transformers ranging from 3,000 kVA to 25,000 kVA for Sweden.

PERSONALITIES

IN THE INDUSTRY

We have news this week of several members of the industry who are taking up positions across the Atlantic. From the South Eastern Division of the B.E.A., **Mr. G. R. B. Morgan,** A.M.I.E.E., generation engineer, operation, northern group, and **Mr. E. D. Holdup,** M.Sc. (Eng.), D.I.C.), A.M.I.E.E., A.M.I.M.E., A.C.G.I., A.M.I.I.A., station superintendent at Kingston power station, are both leaving to join the Hydro-Electric Power Commission of Ontario. Mr. Morgan is to be responsible for the administration of all the Commission's steam plant in the Province, including the commissioning of the two new generating stations at Toronto and Windsor (J. Clark Keith); Mr. Holdup is to take up the post of station superintendent of the J. Clark Keith (Windsor) power station. Much British plant is being installed in these stations, present plans are for the Toronto station to have four 100 MW Parsons turbo-alternators and the Windsor station three 60 MW English Electric sets with Babcock and Wilcox of Canada supplying boilers for each. Since 1948, Mr. Morgan has been responsible for the administration of several generating stations in Surrey and Kent, and also for the commissioning of Kingston "B" and Croydon "B" (part). Earlier he had served for twenty years with the London Power Co., and Dundee Corporation, holding various appointments. We wish Mr. Morgan and Mr. Holdup all success in their new sphere.

Mr. G. R. B. Morgan

Three new appointments are announced by A. Reyrolle and Co., Ltd. They concern **Mr. O. A. Chrisp,** who becomes assistant contracts manager, Overseas, and will in future devote his duties to the export side wholly in view of the steadily increasing volume of export business; **Mr. A. T. Crawford,** B.Sc., A.M.I.E.E., is now assistant contracts manager, Home, and thirdly **Mr. W. Fenwick,** M.I.E.E., is appointed district manager for the East Midlands area and will shortly establish an office for the company in Nottingham.

Mr. F. G. Penny, M.Inst.C.E., M.I.Mech.E., has been appointed managing director of International Combustion (Holdings) Ltd., in place of **Sir George Usher,** who has resigned that position with both companies while remaining a director of each.

Mr. A. J. Leather, Assoc.I.E.E., is the district engineer of the Shrewsbury district of the Midlands Electricity Board, and not consumers' engineer as noted on February 22.

Another who is shortly taking up a post across the other side of the Atlantic is **Mr. K. W. Finch,** B.Sc.(Eng.), A.M.I.E.E., A.C.I.S., who has been chosen for the position of general manager of the Trinidad and Tobago Electricity Commission. Since April, 1948, he has been district manager, Cheltenham District of the Midlands Electricity Board. He should be admirably fitted for the task of running the Commission's island-wide electrification system, which is now being built up, for he had considerable experience with the City of Norwich undertaking, which had an extensive rural network. He is, in fact, a native of Norwich, and became apprenticed to the city electrical engineer, afterwards serving with the undertaking till March, 1947, during which time he successively held the posts of h.t. distribution engineer, assistant planning and development superintendent, and senior technical assistant. He went to Cheltenham in March, 1947, as deputy borough electrical engineer and manager. In that city, too, he has identified himself with a number of interests, including the Cheltenham Engineering Association, of which he is president. Mr. Finch expects to sail for the West Indies early in June.

Mr. K. W. Finch

A further member of the electrical industry who has just gone to Canada is **Mr. E. G. Hebditch,** who has been appointed manager, Montreal area of the British General Electric Co. (Canadian) Ltd. Since 1946, he has been assistant sales manager with Pirelli General Cable Works, Ltd., at Southampton. He joined the G.E.C. in 1920 and after serving an apprenticeship at the Witton Works, went to Fraser and Chalmers at Erith, where he worked on the erection of turbo-alternator sets. In 1925 he became branch engineer to the G.E.C. at Singapore, and after, managing various branches in Malaya was appointed chief engineer, of the company, for Malaya, in 1938, returning to Southampton, 1946. Last year, he was chairman of the Mains Cable Manufacturers' Association (Super Tension).

Mr. E. B. Hebditch

Ekco-Ensign Electric Ltd. announce the appointment of four new representatives. They are: **Mr. E. Jackson** and **Mr. G. D. Ruskin,** who will be based at the company's Southern Sales Office at 5 Vigo Street, london W.1, and **Mr. R. Baker** and **Mr. D. McLeod,** who will be based at the company's office at 26 India Street, Glasgow.

The many friends in this country will be interested to hear that **Mr. E. E. Sharp,** familiar for his connection with Venner Time Switches Ltd., and the E.I.B.A., is due to arrive in England with Mrs. Sharp on the 22nd of this month. They are coming here for a three months' holiday from South Africa, where they reside. Those who wish to do so may contact them c/o Mr. L. C. Sharp, at Rowbarns Grange, East Horsley, Surrey.

At the meeting on Wednesday of last week of the Institute of Welding, the Sir William J. Larke medal for 1950 was presented to **Mr. I. C. Fitch,** electrode development engineer in the Welding Department of Metropolitan-Vickers Electrical Co., Ltd., for his paper on "Arc Welding Electrodes—Their Uses and Abuses."

It is announced that **Col. Sir H. Stanley Angwin,** K.B.E., D.S.O., M.C., T.D., is to relinquish his appointment of chairman of Cable and Wireless Ltd., to take up a post with the Commonwealth Telecommunications Board. He is to be succeeded by **Major-General L. B. Nicholls,** C.B., C.B.E., now managing director of the company. In addition, **Mr. N. C. Chapling,** traffic manager, is appointed managing director. The appointments will take effect from April 1. General Nicholls has been a director of the company since January, 1947, and managing director from April, 1950. During the war he was Chief Signal Officer to Field Marshals Alexander, Montgomery and Maitland Wilson, and to General Eisenhower.

General L. B. Nicholls

Previously demonstrator in the Friern Barnet and Southgate districts, Northmet sub-area, Eastern Electricity Board, **Mrs. Kaye Newman** has this month taken up her new post of senior housecraft adviser in the No. 2 (Taunton) sub-area of the South Western Electricity Board.

Mr. J. S. Turnbull, blade engineer in charge of the precision casting shop of the Metropolitan-Vickers Electrical Co. at Trafford Park, has been awarded the Joseph Whitworth Prize for 1950 by the Institution of Mechanical Engineers for his paper on "The 'Lost Wax' Process of Precision Casting." In addition, **Mr. K. W. Todd** of the gas turbine department of the M.-V. Co. has been awarded the Institution's Prize to the value of £15 for his paper on "Some Developments in Instrumentation for Air-flow Analysis."

At present public lighting superintendent at Derby, **Mr. W. H. Shaw** has been nominated chief assistant lighting engineer to the city of Coventry, to be in charge of the street lighting section of the City Engineer's Department, which the Council recently decided to set up.

District engineer at Burnley to the North-Western Electricity Board, **Mr. H. Leaver,** A.M.I.E.E., retired from that position last week. He was presented with a wrist watch by Mr. R. H. Harral, M.I.E.E., M.Inst.F., sub-area manager, on behalf of the staff.

Retiring at the end of this month, **Mr. A. C. Owen,** M.C., D.F.H., manager of the Cornwall sub-area of the South Western Electricity Board, has had 40 years' experience in the supply industry in that county. His successor is **Mr. C. J. Hocking,** M.I.E.E., who, since October, 1949, has been deputy secretary (commercial policy) at the Bristol H.Q. Mr. Owen started his career with the Lancashire Electric Power Co. Ltd., with whom he served as assistant mains and substation engineer. He joined the old Cornwall Electric Power Co. in 1910 as mains engineer, and in 1933 became chief distribution engineer to the company and its associate undertakings in Cornwall and Devon. From 1939 until vesting day, he was general manager of the Cornwall Electric Power Co., and its associated concerns in Devon. Interested in sports, Mr. Owen is also an enthusiastic gardener. May his prize chrysanthemums long continue to thrive! His successor, Mr. Hocking, a native of Plymouth, was educated there, and has served throughout with the city electricity undertaking, with which he commenced in 1919. He became deputy city electrical engineer in 1938, holding that post till 1947 when he became city electrical engineer in succession to Mr. H. Midgley, M.I.C.E., M.I.E.E., who was appointed deputy chairman of the South Western Board some months prior to vesting day.

Mr. A. C. Owen

Mr. C. J. Hocking

Mr. Leslie Gamage, vice-chairman and joint managing director of the General Electric Co., Ltd., left London on February 24 by air *en route* to Ceylon, Australia and Malaya. He was accompanied by his wife the **Hon. Mrs. Leslie Gamage**. Flying via Rome, Cairo, Karachi, Bombay and Colombo, they intend to continue their journey to Australia in the s.s. *Orontes,*

returning to this country by air on April 29. Mr. Leslie Gamage has not visited Australia since 1936, owing to the intervening war years, since when the British General Electric Co., Ltd., has expanded both its sales and manufacturing interests in Australia. Mr. Gamage intends visiting B.G.E. branches and works there, and to avail himself of the opportunity of discussing mutual problems with **Sir Harry Brown,** chairman and joint managing director of the British General Electric Co. (Australia) and with **Mr. Edward Hirst,** vice-chairman and joint managing director of the company.

Well known in the advertising world for his association with the national and technical advertising accounts of the General Electric Co., Ltd., **Mr. R. B. Greenwood** has resigned from that company to become a founder-director of Marshall Green Ltd., a new advertising agency.

Mr. Arthur E. Hardiman, A.S.M.A., A.I.W.M., has been appointed personal assistant to the managing director of H. Fisher (Oldham) Ltd. He has, up till recently, been divisional sales manager of Bendix Home Appliances Ltd., and before that acted for many years as M.A.P. production engineer in the Rolls Royce works at Derby.

Our congratulations to **Ald. E. Simms,** a part-time member of the South Eastern Electricity Board, who has been invited to become mayor of Brighton for the Festival year. He was, of course, for many years chairman of the Brighton Corporation Electricity Committee.

The Brightside Foundry and Engineering Co., Ltd., (Heating and Air Treatment Division), announce the appointment of **Mr. J. G. Johnson** as manager of their Manchester office at the Liverpool branch of the company. **Mr. H. S. Crump** is the manager.

The North Western Division of the British Electricity Authority achieved a remarkable success at the Hotel and Catering Exhibition held in Manchester recently. The team won four first-prize silver medals out of a possible six in the Individual Competitors Competition (Industrial Section). Medal winners were **Mr. C. Klien,** chief instructor; **Miss A. Wells,** assistant to the canteens manager; **Mrs. M. Fidler,** pastry cook, Stockport canteen; and **Miss M. Shaw,** canteen manageress.

Left to right: front row, Mr. C. Klien; Mr. L. H. Willis; Miss A. Wells. Back row, Miss M. Shaw and Mrs. M. Fidler

OBITUARY

We learn of the death, on February 26, of **Mr. A. J. Leyland,** B.SC. (TECH.), M.I.E.E., joint general manager of Automatic Telephone and Electric Co. Ltd., and a director of British Telecommunications Research Ltd. Educated at Manchester School of Technology, he began his career with the General Electric Company (Peel Conner Telephone Co.) at Coventry, and joined A.T.M. in 1923. For several years he was closely concerned with the design, manufacture and installation of automatic telephone equipment, including the equipping of the London network with director equipment. For the next ten years he was engaged in furthering the firm's overseas interests, and was resident engineer in Buenos Aires from 1928 to 29, Antwerp in 1931, Poland from 1931 to 32, Lithuania in 1933, and from 1934 to 39 was European technical engineer for telephone schemes in Belgium, Poland, Lithuania, Denmark, Latvia and Russia. In 1939 he became chief engineer of the Liverpool company and was appointed a director in 1943.

Mr. A. J. Leyland

Sir James Scott Pringle, K.C.B., O.B.E., M.I.E.E., director of electrical engineering to the Admiralty from 1937 until 1945, died on February 27, aged 57. On retiring from Admiralty service he was appointed a consulting engineer to the Metropolitan-Vickers Electrical Co., Ltd.

We regret to record the death on March 4 of **Mr. F. C. Knowles,** M.I.E.E., aged 69, who was, for 26 years, sales manager of Evershed and Vignoles Ltd., retiring from that position at the end of March, 1949. He founded that firm in 1900 and was for long associated with the development, manufacture and testing of Evershed products. He was a past chairman of the I.E.E. Measurement Section and a founder member of the Society of Instrument Technology. His loss will be mourned as one of the most kindly and well loved members of the measurement world.

We learn of the death of **Mr. W. T. Bower,** of Sutton Coldfield, who was Midland representative for Drake and Gorham Wholesale Ltd. for over 25 years.

We note the death in Glasgow, on March 3, of **Mr. A. W. M'Master,** A.M.I.E.E.

The death has occurred of **Mr. P. Purdie,** aged 36, assistant general manager of William Broady Ltd., electrical engineers, of Hull.

We hear of the recent death of **Mr. P. C. Bullock,** A.M.I.Mech.E. A.M.I.E.E., who was for a time head of the Power Section of the British Broadcasting Corporation.

Design for Happiness

Effortless housekeeping is Electricity's gift to the IDEAL HOME

FESTIVAL year is an appropriate time for reviewing a century of progress in living. Today's homes are indeed a far cry from the stuffy villas of the Victorian era and a comparison of these modes of life has been adopted by many exhibitors as their theme for this year's *Daily Mail* "Ideal Home" Exhibition, opened at Olympia, London, this week.

Leading in from the Addison Road entrance of the Grand Hall is a magnificent red carpet, typical of the Victorian love for sumptuous luxury, which leads through an avenue of furnishing exhibits to a modern replica 50 ft. high of the Crystal Palace of the Great 1851 Exhibition, constructed not from steel but from magnesium alloy, one of the latest light metals. Sharing part of the "Palace" with Silk is the "Glass" feature presented by Chance Brothers who made the glass for the original building and who today are well known in all spheres including the electrical industry for the quality of their products. Their display includes glass for building, for lighting and for signalling, a highlight being a modern lighthouse optic seen rotating.

To the left of this outstanding feature is the Electricity Pavilion where the Electrical Development Association, in keeping with the tone of the whole show, present an interesting tableau in which they bewilder our Victorian forebears with the wealth of aids to ease and efficiency which electricity has presented to us. The scenes are typical of home life in five ages; we enter in 1851, pass through a drawing room of 1876, into the Edwardian kitchen of 1901, to bed in a 1926 room, finishing in the ideal kitchen-dining room of 1951.

Gathered around this pavilion with its comprehensive selection of appliances and apparatus, are the stands of many manufacturers. H.M.V. with their display of radio, T.V. and household appliances, the General Electric Co. with a complete range of domestic appliances, especially the self-adjusting cleaner, Gleco Fittings Ltd. with a display of lighting fittings, English Electric whose well-designed stand concentrates attention on the 6.4 c. ft. refrigerator, their cookers, the "Ritemp" washing machine and the many useful appliances for the home and Belling and Co., who are particularly proud of three recent arrivals, the "Streamline" cooker mounted on a special wheeled base which permits its withdrawal about 2 ft. from the normal place for thorough home cleaning, the "Hotspur" portable fire now available with a special mesh safety guard and the "Adam" fire, a re-introduction of a pre-war period model.

Stand number sixty is occupied by Frigidaire Division of General Motors who are giving pride of place to their latest household refrigerator Model OMM 74, a handsome newcomer of 7.3 c. ft. capacity powered by the "Meter Miser".

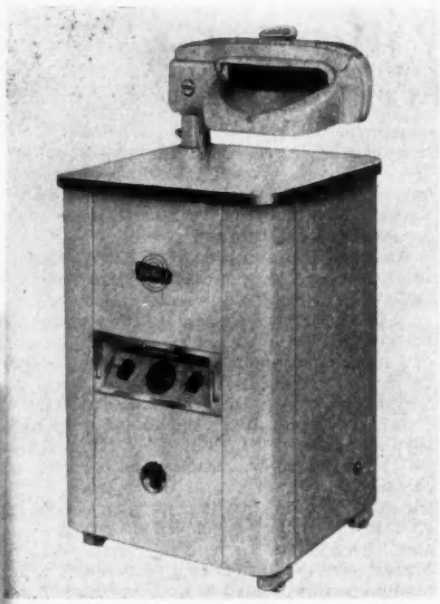
Alongside them are L. G. Hawkins who are showing the latest model "Electric Hostess" together with many well-known Hawkins appliances and a Kelvinator refrigerator.

Across on the north side of the Grand Hall are Bratt Colbran Ltd. who are known as makers of well-designed heating appliances. New this year are a floodheater designed for ceiling wall fixing in bathrooms and similar rooms—this has loadings of 1 and 1¼ kW, and a pleasantly styled convector heater rated at ¾ kW and 1½ kW.

Harmonising with the Silk display in the Grand Hall is the display of silk shades and other lighting fittings shown by Philip Shaw (Contractors) Ltd., who have their displays adjacent to the central feature, while next door, Windak Ltd. show the modern healthy way to obtain the warmth and comfort so beloved of the Victorians. They demonstrate the Windak electric "safety" blanket which incorporates a transformer reducing mains voltage to 24 V for safety.

Back across on the Hammersmith Road side are the displays of "Prestcold" refrigerators and Elexcel Ltd., with a selection of first grade electric cookers and domestic appliances. The "Xcel" models K107 and 108 now have control switches

Victorian flashback at E.D.A's Pavilion



This is Versco's new "Swirlux Laundromatic"

in black to harmonise with the general colour scheme of the cookers.

A bright spot in this corner is the display by British Electric Lamps of lamps designed to operate without shades in wrought iron, glass and similar fittings. Our attention was, however, distracted by the picture from the new projection television model shown by Valradio Ltd. on the next door stand. This TV model is available in versions operating from 50 V and 110 V supplies and from d.c. mains as well as from normal supply voltages.

In the National Hall adjacent we found time to grow green with envy in the Village of Ideal Homes, where we noticed that the designers and furnishers were quite conscious of the value of electricity in the home in its many forms.

The Grand Hall gallery, however, was more important from our professional viewpoint, for here is housed the domestic labour saving section. Featured amongst the displays of equipment here are the new Bendix model D automatic home washer, and a display by Kenwood Electrics Ltd. featuring the many Kenwood appliances together with the "Electric Chef." Singer Sewing Machines display their many electrically powered machines together with a new Singer heat-controlled iron. Displays by Tellus Super Vacuum cleaners, The Water Softener and Vacuum Cleaner Service Co., Electrix Ltd., Electrolux Ltd. and National Utilities help to clean up matters, but attracting much attention is the new "Com-bo" machine by the Henray Electrical Co., a model which combines both vacuum cleaner and floor polisher under one head.

Further on is the stand of Columbus Ltd., where the "Mechanical Charwoman" is seen performing back aching tasks with complete ease.

Shown to the public for the first time at this year's show is the new "Swirlux" range of washing machines. These are the result of many years research by Universal Boilers and Engineering Co., and are worthy of particular attention. All machines incorporate a new patented design agitator, whilst the 504 "Laundromatic" model is a machine having an automatic control of washing time for different loads, a principle unique.

Hoover Ltd. have several displays on this floor devoted to their range of electric cleaners and motors, whilst one is devoted to a display of the Hoover washing machine which has made such a "hit" since it was introduced.

New this year is the "Cheeto" pulveriser, a machine for grinding coffee, preparing breadcrumbs, vegetables, etc., in a few seconds. It is shown by John Perry (plastics) Ltd., suppliers of the "Cheeto" handy electric mixer. Also along this north side of the Grand Hall gallery is the stand of Wilkins and Mitchell Ltd., makers of the "Servis" electric washing machines which handle up to 9 lbs. of clothes with ease and have economical electricity consumption.

"Goblin" products are again featured in the Grand Hall gallery near the display by H. Fisher (Oldham) who show the latest Fisher Junior washing machine.

J. H. Walter Ltd. and Thor Appliances Ltd. are on adjacent stands, the Walter "no cord" iron and a new addition, the Walter clothes dryer and airer, making a useful complement to Thor's 1951 Automagic clothes and dish washing machine and the new "Stowaway" unit. For those who prefer rotary ironers there are two "Oprim" models, table and cabinet, displayed by the Aircraft and General Engineering Co., a few stands further on. On the way there you will pass Vactric Ltd., vacuum cleaner and floor polisher makers, who are making a special feature of the "Multipol" hand polisher and bench tool.

Two special displays for men in the Fashion and Beauty section are the exhibits of Remington Rand Ltd. and John A. Fransen Ltd. On the stand of Remington Rand there are demonstration models with which the visitor can test the comfort and simplicity of shaving with the "Blue Streak" electric dryshavers. Fransen's feature the "Rabaldo" models. Next door to them Pifco Ltd. have displayed four aids to health and beauty, the Pifco vibratory massager, the streamline hairdryer, an infra red and radiant heat appliance and an electric heat massager.

Perhaps the most pointed compliment to elec trical power is the "Ideal Home" Kitchen designed by Margaret Sherman, editor of the *Daily Mail* Ideal Home Book. As a woman who reflects the opinions of many thousands of housewives it is indeed pleasing to find that she includes in her "Ideal Kitchen" amongst other things, a Moffat electric cooker, a Prestcold refrigerator, and an automatic washing machine by Bendix.

The Dollar Convention

EXCELLENT PROSPECTS IN NORTH AMERICAN MARKETS

THE ghost of the dollar shortage which has haunted this country since the end of the war, hovered over Eastbourne last weekend when manufacturers and representatives of the Dollar Export Board met to confer on export problems in the dollar areas. There is little doubt, however, that the phantom which has played such a large part in the lives of ministers, industrialists and the general public in recent years, will have been at least partially exorcised as a result of the speeches and discussions among some 700 delegates who attended.

At the opening session, the Chancellor of the Exchequer most appropriately outlined the Government's policy, answering three posed questions. He said that the drive for more dollars must continue, not only because the present situation may not be as favourable in the future, but also because imports from dollar areas would be far greater this year than in 1950. He referred also to the impact which the rearmament programme would have on the drive and to the grave shortage of raw materials. Defence would undoubtedly cause a falling off in exports from some industries, said the Chancellor, but they would have to be balanced by an increase from other sections.

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Representatives of the electrical industry, although basing their talks on their own experiences, generalised rather than dealt specifically with electrical products because audiences were by no means confined to electrical engineers. Emphasis was laid on Canada rather than the U.S., which is already more than self-sufficient in electrical equipment production and, as Mr. D. Maxwell Buist, export director of B.E.A.M.A., remarked, "had been tacitly written-off by his Association as a prospective market."

Sir George Nelson, chairman and managing director of English Electric Co., Ltd., who had returned only the previous week from a tour of the Commonwealth, advocated that all with potential and existing world businesses should undertake similar tours. Sir George appealed to all when he said "overseas business, especially in dollar areas, is not easy to secure and in these times when it is so much easier at home, some people may neglect these markets. It is the duty of each of us to play our part in endeavouring to take our share."

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Dealing with the present unstable international situation, Sir George said: "Canadian purchasers are worried about ordering plant from England because of their fear of a third world war and of the possibility of our directing materials for other uses. Fortunately, some assurance that this would not happen has been given by the President of the Board of Trade, but I doubt whether the statement, as it stands, will satisfy buyers." He went on to say that members of the industry should help each other to enable an unqualified statement to be made that orders would be fulfilled.

Sir George suggested that the demand for power station machinery was a barometer of the potential business in heavy and light industry generally. In 1948 Canada planned an increase in electrical generating capacity by some 50% during the following five years and at least a similar increase by 1958. This was a measure of the potential dollar earning capacity of Canada for Great Britain.

Trade with other Commonwealth countries had been lost to dollar competitors because U.S. and Canadian consultants had established themselves in those countries. Taxation left no margin for such pioneering work by British firms and consulting engineers traditionally do not resort to advertising. He urged that either consultants themselves or the B.o.T. should endeavour to solve the difficulty.

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Mr. Buist briefly outlined some of the prospects which Canada had for British manufacturers. "Hydro-electric power is her greatest and most obvious natural resource," he said,

"and I estimate that she will be utilising the whole of her available hydro-power in about 30 years. Although the population of Canada is only a quarter of ours, her annual output of electricity is the same, and due to her vast aluminium, paper, pulp and other industries, she uses 50% more electricity per h.p. of generating plant than the U.K.", he said. The dominion's harnessable power was four and a half times the existing capacity. He went on to give his estimates of expenditure on projects and expansions being planned. Emphasising that these were very conservative estimates he mentioned the development of hydro-electric power between now and 1956 which was to cost $1,800 million, of the railways (both steam and electric) to cost $750 million, and of telecommunications, which would account for a further $350 million. Mr. Buist gave figures to support the fact that Canada's importation of machinery and electrical equipment from the U.S. during 1949 were so preponderant that the transfer of a mere 10% of them would have trebled our own exports to Canada in that class of capital goods. (It was later stated that a contract valued at $1,200,000 had been obtained by Siemens & General Railway Signal Co. for automatic signalling and interlocking equipment for Yonge Street Subway, now under construction in Toronto.)

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If Sir George Nelson was able to base his talk on experience only a few weeks old, the Hon. A. C. Geddes, sales director of Brush Electrical Engineering Co., Ltd., was in an even better position to advise his audience, having disembarked from the *Queen Mary* only a few hours before addressing the Convention. His talk provided a wealth of useful hints and information invaluable both to manufacturers with established business in N. America and those deliberating on the possibility of tackling the market.

Mr. Geddes felt that as all N. Americans expected war any moment, it was difficult to sell anything which required maintenance. "You must be certain to deposit a complete set of drawings and an adequate supply of spares." He warned the meeting against trying to introduce novelties into the U.S. The Americans would accept them, he said, but the necessity for such goods would have to be "dinned" into them and that was far too costly.

He continued : "There is no reason why British manufacturers should not be successful in the American market. We are specialists in engineering and the quality of our goods far exceeds American equivalents, which are probably mass produced." U.S. buyers, he said, had to be spoonfed, technical representatives had to be on hand to explain every detail. Of equal importance was the availability of spares—good representation in this field and half the battle was won.

Lord Verulam, speaking by radio-telephone from Cape Town, added encouragement to those venturing into N. American markets, particularly in Canada, where the electrical industry was still not large enough to handle all the needs of the rapidly growing country. Of his own company's experience, he said, " We have found that the sending of electrical engineers across the Atlantic, sometimes at a moment's notice, has justified itself."

$ $ $

At the plenary session on Friday morning devoted to Canada, Mr. James Duncan, chairman of the Dollar Sterling Trade Advisory Council, told delegates that although the Dominion was exceptionally friendly towards Britain and wanted to help the mother country, she would not place orders solely on that score. Contracts would have to be found and U.K. firms would have to satisfy fully their prospective customers. He strongly advised that now Britain had established herself in the Canadian market, she should not withdraw. "Another gap in trade between the two countries would be fatal," he said.

The Convention ended as it had begun with addresses by Government speakers. Both Mr. Harold Wilson, president of the B.o.T., and Mr. George Strauss, Minister of Supply, assured delegates that there was no intention to bring in a widespread system of strict controls. The Government, said Mr. Strauss, would rely on industry to work out systems of allocation and control under general guidance. British imports of copper, aluminium and nickel were secure for a long time ahead. Mr. Wilson stated that the ability of this country and the North Atlantic community to maintain industrial production and the defence effort depended largely on the outcome of current talks in Washington on international allocation of raw materials.

Finally, a special word of praise for the Dollar Export Board, and to Sir Cecil Weir in particular, for the remarkable thoroughness with which the whole Convention was organised. Speakers did all they could to assist manufacturers, except maybe actually to sell the goods and find the contracts.

The BUYER'S *Column*

A Family Battery Charger

A NEW family battery charger introduced by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, enables 2 V, 4 V, 6 V, or 12 V lead-acid accumulators to be charged at home from the a.c. mains. The unit incorporates a G.E.C. selenium bridge rectifier, and has a double-wound transformer to ensure complete isolation from the mains. Tappings are provided on the standard model for the 200/250 V range of mains supplies, but chargers for 100/125 V can be supplied to special order. A plug-and-socket adjustment for the various battery sizes is located on the front panel. In normal circumstances the charging rate is 3 amps. An ammeter is fitted on the panel to show the charging rate. A red sector on its scale draws attention to excessive current and serves as a warning that the rheostat needs adjustment, or of a fault in the battery on charge.

G.E.C.'s family battery charger is a neat and useful unit for the home

Fuses are fitted in the input and output circuits as a protection against overloads. The case is provided with brackets at the rear for wall mounting. The charger measures 9½ in. wide by 5 in. high by 5½ in. deep and weighs 8 lb 12 oz. The price is £6 4s.

P.Tax Changes for "Coldrator" Models

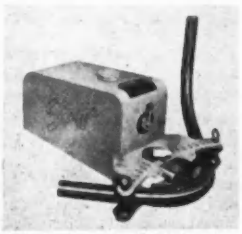
PURCHASE tax on "Coldrator" domestic models supplied by the INTERNATIONAL REFRIGERATOR CO., LTD., of Crown House, Aldwych, London W.C.2, is in future to be computed at a uniform rate whether or not retail discount is 22½% or 17½%.

As from March 1 purchase tax will be calculated on the list price less £2 10s. service and guarantee fee. Total user prices of the three "Coldrator" domestic models is as follows: model CD3, £75 8s. 4d.; CT45, £88 2s.; CD5, £100 15s. 7d.

New "Staffa" Tube Bending Machine

IN addition to the "Staffa" 4 in. motorised hydraulic tube bending machine, CHAMBERLAIN INDUSTRIES, LTD., of Staffa Road, Leyton, London E.10, now offer a redesigned 2 in. machine incorporating the features of its parent model.

The new machine (with overall dimensions of 3 × 1 ft × 2 × 1½ ft × 1 ft 7 in.) is a neat, compact and entirely self-contained unit, which requires no hydraulic accumulator or airline as the pump is mounted in its own reservoir of specially selected Shell "Tellus" 27 hydraulic oil. The complete power unit is totally enclosed by a detachable top housing. Hydraulic power is provided by a patent Beacham high-pressure swash plate pump mounted directly above an 8 ton x 10 in. stroke double-action ram unit, driven by a ½ h.p. electric motor suitable for 220-230 V, single-phase, 50 c/s supply, or for 400-440 V, 3-phase. A 3-way control valve fitted with a relief valve for "Forward" "Return" and "Neutral" position is operated by an easily accessible lever mounted at the front of the machine.



The 2 in. "Staffa" bender

A novel feature has been introduced to facilitate easier removal of the bent tube from the bending formers: patent take-off arms are provided on the end formers so that on the return stroke the tube is automatically ejected from the former.

The machine has ample power to bend, cold and unloaded, all classes of steel tubes to BSS 1387, 1947, and also electrical conduit tubing from ⅜ in. to 2 in.

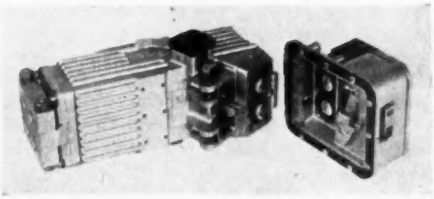
"Breeze" Ground Service Connections

THE "Breeze" heavy-duty ground connector, recently introduced by the PLESSEY CO., LTD., Ilford, Essex, is particularly suitable for connecting aircraft to ground service trucks for the purpose of engine starting, or for the conservation of aircraft power supplies while the machine is grounded. Available in 24-V or 120-V versions, the connector has a continuous current rating of 350 amp, and will carry a peak load of 1,500 amp.

Connection is made by domed butt contacts, tipped with a special material to ensure continued low-contact resistance. Spring-loaded contacts on the cable unit ensure accurate alignment and ample contact pressure when the two portions are

mated. A slam catch retaining lock is fitted so that the cable unit cannot be accidentally pulled away from the fixed unit, and a trigger release is provided to disengage the connector.

Plessey's "Breeze" Aircraft-Ground Connector



Price Increases

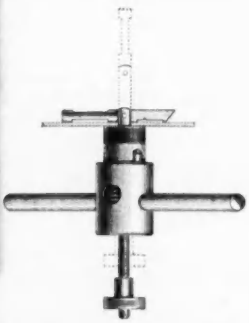
ELEXCEL LTD., Victor Works, Broad Green, Liverpool 14, announce increased prices for "Xcel" electric cookers and fires. Revised price lists are obtainable on application. Increases are effective from March 1.

The "Avo" signal generator has been increased as from March 7 to £30 we are informed by the AUTOMATIC COIL WINDER AND ELECTRICAL EQUIPMENT CO., LTD., Winder House, Douglas Street, London S.W.1. This price applies to both mains and battery models.

Easier Hole-Cutting for Contractors

ADDED to the range of "Euco" constant-feed hole cutters is a new tool which enables holes to be pressure-cut without the need for access to the interior of the tank or similar compartment.

Primarily designed for use when fitting special flanges such as those for the connection of pipes, thermostats and immersion heaters, the new tool employs the "Enox" saw-tooth cutter blades in conjunction with a special toggle spindle. This is inserted in the usual pilot hole and the pivoting action causes the toggle to take up a position at right angles which affords the essential support for the tool inside the tank.



This new "Euco" tool speeds up installation work

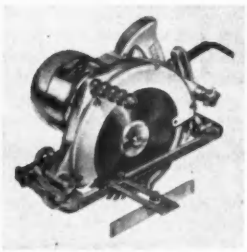
In operation the knurled spindle nut is tightened up and the hole is cut out in the usual manner. When cutting is completed the spindle nut is slackened off, the tool returned to its original position and removed together with the cut out portion.

The tool is supplied amongst other patterns, as an electrical conduit set for $\frac{5}{8}$ in., $\frac{3}{4}$ in. and 1 in. sizes, complete for £3 1s., from EUCO TOOLS, LTD., 44 London Road, Kingston-on-Thames, Surrey.

10 in. Rotary Saw by Wolf Tools

MAGNESIUM alloy used in the frame construction has enabled WOLF ELECTRIC TOOLS, LTD., of Hanger Lane, Ealing, London W.8, to market what they claim is the lightest yet most powerful 10 in. saw available at present.

This is the type R.S.10, a 10-in. portable all ball-bearing electric saw. Incorporating a powerful motor of advanced design, the unit has been provided with a range of blades adequate for all general purposes. Safety is ensured by the provision of a spring-load guard of sheet steel which completely covers the blade where not arranged for cutting. A sheet steel sole plate provided is cadmium-plated for protection against corrosion.



Wolf's new 10" saw is claimed as lightest available

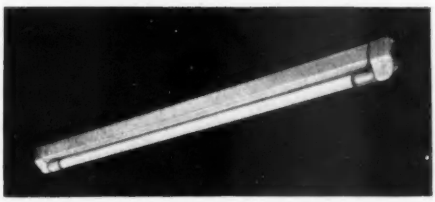
Depth of cut is determined by hand-wheel adjustment on a vertical quadrant and the addition of a swing knife made of tempered spring steel effectively relieves back pressure of the saw blade. To ensure accurate positioning for straight and up to 45° bevel cuts a line of cut indicator is provided on the leading edge of the sole plate.

The R.S.10 unit is supplied compactly housed in a strong steel carrying case which has ample accommodation for extra cable and saw blades.

Simple Efficiency in Lighting

A NEW fitting introduced recently by SMART AND BROWN, ENGINEERS, LTD., Trading Estate, Spennymoor, Co. Durham, which combines attractiveness with simplicity, is Model CB15.

Smart & Brown's CB15



For use with a single 5 ft 80 W lamp, the fitting is constructed from aluminium with one-piece cast aluminium end sections which serve as lampholder covers. For centre point fixing the unit is finished in two coats of white stove enamel, having been pre-treated to ensure efficient bonding.

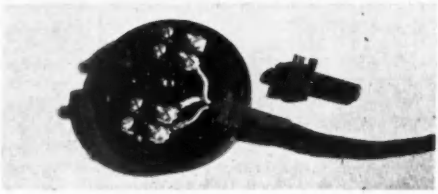
Price, which includes control gear but is less lamp, is £5 7s. 6d.

"Vibak" Plastics Take the Shocks

THE telephone junction box seen in our picture illustrates one of the many applications of "Vibak" flexible moulding compounds. These moulding compounds supplied by BAKELITE, LTD., 18 Grosvenor Gardens, London S.W.1, are used by Hellerman Electric Co., Ltd., of Crawley, in the production of grommet sleeves. They are sufficiently stiff to throw the head clear and yet are sufficiently flexible to facilitate fixing. Once fixed, the cable is held under tension.

These "Vibak" compounds have a great variety of applications due to the properties of high dielectric strength combined with resistance to water, oil and grease, and chemicals. They are available in a range of hardnesses to suit many different applications and in a range of colours.

A telephone junction box showing grommets moulded from "Vibak" compounds



New "Ace" Receivers

ACE RADIO Ltd., Tower Works, Tower Road, N.W. 10, announce the prices of the following three new models:—

Model 600 *RG* "*Berkeley*"—9 valve, 9 waveband bandspread receiver with RF amplifier stage and 10 W push-pull output with Garrard RC 72 Record Changer, housed in a dignified cabinet incorporating record storage, finished in English walnut, figured eucalyptus and beech. Dimensions 3 ft 10 in. long by 2 ft 11½ in. high by 1 ft 5 in. deep approximately. List price £91 18s 6d plus purchase tax £39 6s 6d. (125 gns.)

Model 51—5 valve, 3 waveband table model receiver in handsome walnut cabinet with 8 in. speaker. Dimensions 19 in. wide by 13½ in. high by 10 in. deep approximately. This model will be on display at the Festival of Britain. List Price £19 0s 6d plus purchase tax £4 1s 6d. (22 gns.)

Model T645—6 valve including magic eye, 4-band receiver with 8 in. high flux loudspeaker. Waveband coverage, 1,000-2,000, 270-570, 130-275, 16-31 metres, housed in a figured walnut cabinet inlaid in ebony and bleached sycamore. Dimensions 23 in. wide by 17 in. high by 8 in. deep approximately. List price £20 15s 3d plus purchase tax £4 8s 9d. (24 gns.)

TRADE PUBLICATIONS

HOTPLATES FOR THE PLASTIC AND RUBBER TRADES. Induction heated hotplates for the trade are featured in a leaflet issued by Berkeley and Young Ltd., Tyseley, Birmingham 11.

FLOODLIGHTING. A folder describing the range of Simplex Floodlighting equipment is available from Simplex Electric Co., Ltd., Oldbury, Birmingham.

CABLE POTENDS. Type P.W. Potends designed for signal engineering are made by Siemens and General Electric Railway Signal Co., Ltd., East Lane, Wembley, Middlesex, and are detailed in Booklet S.G.E.1331 available from the company.

DEGREASING COMPOUNDS. Facts about degreasing are to be found in a booklet issued by Basol Ltd., 16 Bolton Street, London W.1.

COUNTRY HOUSE LIGHTING. From Tudor Accumulator Co., Ltd., 50 Grosvenor Gardens, London S.W.1 prospective buyers can obtain a leaflet giving details of Tudor installations for country house lighting.

LIGHTING FITTINGS. The latest catalogue of lighting fittings with price lists is now available from Wm. McGeoch and Co., Ltd., Warwick Works, Coventry Road, Birmingham 10.

BROACHING MACHINES. A modern range of V-type general purpose hydraulic pull down broaching machines is described in a bulletin received from the Lapointe Machine Tool Co., Ltd., of Edgware, Middlesex.

THEATRE LIGHTING EQUIPMENT. The Major Equipment Co., Ltd., are suppliers of complete equipments for theatre lighting. A series of leaflets are now available dealing with dimmer switchboards, floods, battons and footlights, spotlights and associated gear. The firm also runs a hire service. The address is 22 Gorst Road, Park Royal, London N.W.10.

ACCESSORIES. A leaflet issued by Julius Sax and Co., Ltd., 24 Commerce Road, Brentford, Middlesex, deals with the Sax range of rubber-covered plug tops.

GENERATING EQUIPMENT. Publication No. 23061, issued by Brush Electrical Engineering Co., Ltd., Loughborough, Leicester, features the company's range of Salient pole alternators (Type OTS) which have outputs from 40 kVA to 250 kVA.

REMOTE INDICATING THERMOMETERS. The Cambridge Instrument Co., Ltd., 13 Grosvenor Place, London S.W.1. have just published an interesting folder, No. 65A, in which details are given of the latest types of Cambridge Mercury in Steel Thermometers.

SWITCHGEAR. Details of equipment supplied recently to an Australian supply authority are to be found in "Switchgear News" No. 8 issued recently by Cooke and Ferguson Ltd., Victoria Street, Openshaw, Manchester.

SOUND MEASUREMENT. A leaflet describing the "Dawe" sound level meter type 1400 is available from Dawe Instruments Ltd., Hanwell, London W.7.

THE WEEK

COMMERCE *in news* INDUSTRY

Thorn acquire another Company

AN announcement by Thorn Electrical Industries Ltd. last week revealed that the company has recently acquired the whole of the ordinary share capital of Smart and Brown (Engineers) Ltd. whose factory is situated on the Spennymoor trading estate in Durham. This is the third firm taken over by Thorn's since last autumn. The development and expansion of the parent company has been marked by the acquisition of George Forrest and Sons Ltd. (see our issue of November 2) and this was followed a few weeks later by the taking over from the B.E.A. of Tricity Cookers Ltd., reported in our November 23 issue.

Engineers in the industry will know Smart and Brown as the manufacturers of Hi-Craft lighting etc. We understand that it is Thorn's intention to continue the existing policy of expanding production and thereby providing increased employment in the area.

University accepts B.E.A.M.A. offer

THE Council of the Senate of Cambridge University has accepted the contribution of £71,000, subscribed by member-firms of the B.E.A.M.A., and accordingly the Chair of Electrical Engineering at the university has now been permanently endowed. As reported in our issue of February 1, the Association appealed to members to support the endowment of a chair. The Association's offer was formally accepted by the Vice-Chancellor at a luncheon at Pembroke College last Tuesday. Representatives both of B.E.A.M.A. and the I.E.E. attended, and Sir George Nelson, the former's president, and Mr. G. Leslie Wates, chairman, together with Sir Archibald Gill for I.E.E., expressed their gratification that the Chair of Electrical Engineering would now be permanently endowed.

New Telcon-Mullard Link

THE formation of a new company, providing a link between the Telcon and Mullard organisations, is announced. The company, with the title of Telcon Telecommunications Ltd., is to promote and co-ordinate the development, manufacture and sale of Telcon cables and Mullard equipment associated with land-line tele-communications. The registered office is at 22 Old Broad Street, London E.C.2. The nominal capital is £50,000 and the issued capital will be held by Telcon and Mullard in equal proportions. The first directors are Mr. J. N. Dean, B.Sc., A.R.I.C.; Mr. J. Innes, C.B., B.Sc., M.I.E.E., and Mr. R. C. Mildner, M.Sc., M.I.E.E. (all representing Telcon), and Mr. J. P. Jeffcock, O.B.E., M.I.E.E.; Mr. C. L. G. Fairchild, M.A., A.M.I.E.E., A.M.I.Mech.E., barrister-at-law, and Dr. C. F. Bareford, M.Sc., Ph.D., A.M.I.E.E. (who represent Mullard). In addition to the extensive backing of the Telcon and Mullard concerns in this country, the new company will be able to utilise the technical resources and experience of the Philips telecommunications organisation in Holland, with whom Telcon has been closely associated for some time.

Exemptions from Metal Controls

SINCE our reference last week to the orders prohibiting the use of copper and zinc for the production of certain articles, the Board of Trade and Ministry of Supply have now made arrangements for certain exemptions from this prohibition. The arrangements particularly concern goods for export. Applications for licences will have to pass certain tests. For instance, the export value of finished articles will have to be at least 15 times the value of the contained copper, brass or zinc in the case of exports to dollar and sterling countries, and 50 times the value for goods going to other markets.

The issue of licences will, we understand, also be considered for Government orders, for special purposes, such as ships, and for goods which form essential parts of other products and contain small quantities of metal. Allocations for work already in progress will also be considered. Manufacturers should address their applications to the Regional Offices of either the B.o.T. or M.o.S. according to which of the two orders covers the appropriate product.

The First Half-Century

Last Friday the Enquiry into the expediency of altering Proviso No. B(6) of the Board of Trade Regulation opened. The alterations proposed were that for "with the consent of the consumer," there be substituted "on such terms and conditions as may be agreed between the undertakers and the consumer or failing agreement may be settled by an arbitrator appointed by the Board of Trade." In short, the undertakers desire to put pressure on the Board that they may be relieved from a pressure to which they are subjected whenever they desire to change the pressure of supply.—*From our issue of March* 7, 1901.

London Tariff Increases

INCREASES in electricity tariffs for the London area, to come into force following meter readings after April 20, were announced by the London Electricity Board last week. The main increase will be from ¾d. to ⅞d. a unit in the running charge of two-part tariffs and in the lower unit charge of block tariffs. Increases in wages and the cost of coal, plant and other commodities are stated to be the reason for this revision which constitutes another step towards the standardisation of tariffs in London.

Small Price Increases in Midlands?

THE Midland Electricity Board was going to take a risk and rely on its efficiency and money saved to cope with the recent increase in bulk supply charges, Ald. W. S. Lewis, chairman of M.E.B. told Birmingham Electric Club at the club's annual dinner last Friday. He forecast that consumers in the area would probably be very surprised at the small increase which was likely to be made. Enlarging on the subject of costs to the consumer, Ald. Lewis said extra charges over which the Board had no control, had reached £3 million since it took over, but none of this had been passed on to the consumer. The Board's chairman also referred to recent accusations concerning the export of generating plant. He said the industry was not short of generating plant—it was of boilers and boiler tubes and buildings that the supply industry was still in great need.

Income Tax too Heavy

ANTICIPATING this year's Budget and the risk of increased taxation, the Federation of Wholesale Organisations has written to Mr. Hugh Gaitskell, Chancellor of the Exchequer, drawing his attention to "the unfair incidence of the existing taxation level as it affects wholesale distribution." The F.W.O. maintain that increased prices on all consumer goods seriously affects wholesale distribution in that it is extremely difficult to carry substantial stocks to meet retailers' demands. Wholesalers have to provide additional capital to finance the purchasing and holding of stocks, but this is all but impossible due to the continual drain of taxation.

The Federation has told the Chancellor that it considers it imperative that there should be some alleviation of taxation for wholesalers. It suggests that this could be achieved by some relief in existing profits tax.

Eliminate the "Black Spot"

IT is to be hoped that the recent installation of fluorescent lighting along Cowley Road, Oxford, will do much to reduce the heavy accident toll in the area. The thoroughfare which is not only a main road leading out of the city but also one which serves a number of large factories, has long been regarded as a local "black spot." The scheme consists of 35 lanterns each containing three 5 ft 80 W fluorescent lamps mounted on columns supplied by Stewarts and Lloyds. The

New street-lighting along the Cowley Rd., Oxford

installation was planned jointly by the City Council and the British Thomson-Houston Co., Ltd. Contractors were Erecon Ltd., of Ware.

Mountbatten at the Batti-Wallahs

A RECORD attendance of 174 members and guests assembled at the monthly lunch of the Batti-Wallahs' Society on Wednesday of last week when the principal guest was Admiral Lord Louis Mountbatten.

Subject of the short talk given by Lord Louis was "The transfer of Power in India," and although time only permitted a brief bird's-eye view of this vast subject, few who listened to the discourse could have failed to get a clearer picture of the magnitude of the problem of a virtual partition of a sub-continent of 400,000,000 inhabitants with a wide diversity of climate and languages, which was already divided into British India and 565 native states. Lord Louis's brief and pithy summary of the methods of evolving a solution brought enlightenment on many points hitherto obscure.

The next luncheon will be held on March 28 when Sir Hartley Shawcross is to be entertained, and the Ladies' Night is being held on March 12.

Jubilee E.C.A. Conference

YORKSHIRE'S famous spa, Harrogate, scene of last year's British Electric Power Convention, has been chosen by the Electrical Contractors' Association and its allied associations as the centre for conference and celebrations to mark their Golden Jubilee.

Provisional programme just released gives details of the functions and social events during the session, Monday, May 28 to Wednesday, May 30. Conference and annual general meeting

of E.C.A. and its associates will be held at the Royal Hall, whilst registration and Presidential reception will be at the Majestic Hotel. Applications for registration as delegates and for hotel accommodation should be made now to L. C. Penwill, director and secretary, Africa House, Kingsway, W.C.2.

Yet another Rural Supply Line

IMPLICATION by Viscount Hinchingbrooke, M.P., speaking at the inauguration of a new 11 kV line between Godmanchester and Brington, Hunts, was that in spite of the fears of many people, the octopus of state control was turning out to be quite a kindly and enterprising creature.

At the ceremony in Spaldwick Victory Hall, Lord Hinchingbrooke snuffed out a candle and pressed a switch flooding the village-hall with electric light. He recalled the efficiency and enterprise of the former supply company in the area and remarked that when in Parliament his party had opposed the nationalisation of the electricity supply industry, it was because they believed that "all the old enterprising work put in by those splendid people in rural areas" would disappear under state control. They might dispute the new forms of public enterprise but on the distribution side the same men as before were working efficiently and well under the state "umbrella."

This new line is a reinforcement line nine miles in length passing through hitherto virgin country. It brings supplies to six villages. Total cost of the project, including village distribution networks, was £34,000.

"Vacuum"

VACUUM technique, although utilised so widely in industry as well as in the laboratory, has hitherto been poorly served in the dissemination of information. A new quarterly journal, *Vacuum*, published by W. Edwards (London) Ltd. of Lower Sydenham 26, fills the need for such a publication, and contains authoritative articles on scientific developments. In addition to articles, a number of pages are devoted to classified abstracts on vacuum research, apparatus, and instruments, these being specially printed for detached filing.

Club is "Embarrassed"

WE hear that the Birmingham Electric Club has been embarrassed by the remarkable increase in membership over the past few years. The embarrassment has apparently been caused by the difficulty in finding suitable accommodation for meetings and social functions. It is, however, an excellent compliment to the club, and should be an added encouragement to electrical engineers in Exeter, where, as previously reported, they are considering the formation of a similar club. The election of 53 new members last year brought the total membership in Birmingham up to 650, though due to resignations that figure was reduced to 625. In the club's revised rules we note that membership will be limited to 650 members, life and honorary life members, and should that figure be reached, further applicants will be placed on a waiting list.

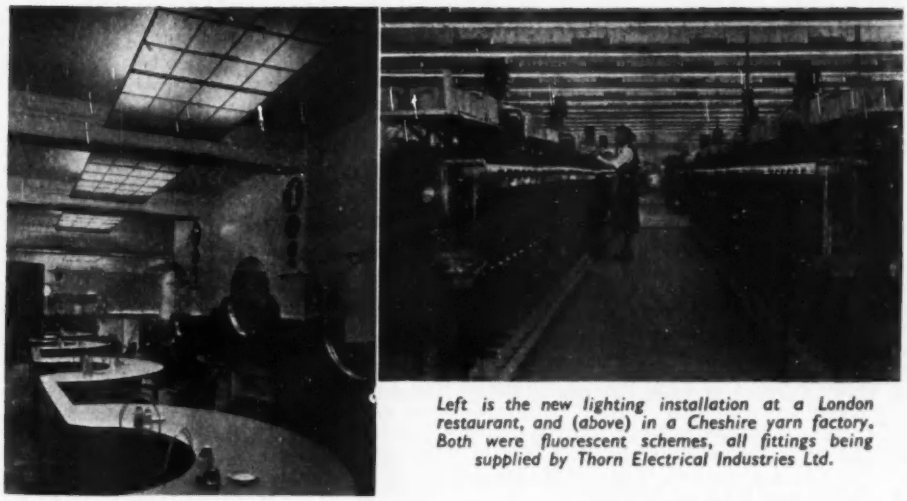
Notification of Price Increases

THE London Electricity Board, we understand, have recently had numerous notifications of increased prices sent to them some time after the date of the increase and in many instances to the wrong address. Consequently the purchasing officer has sent out a circular letter which he hopes will prevent this oversight and the resulting inconvenience. The purchasing officer of L.E.B. is at 46 New Broad Street, E.C.2. While this is the only known instance, we feel sure that manufacturers and all concerned in dealings with the L.E.B. or any of the other Area Boards, will co-operate in notifying them well in advance of any alterations. The London Board asks that notification of price increases should reach them at least by the day before such alterations are due to take place.

Viscount Hinchingbrooke pressing the button to inaugurate the new 11 kV line between Godmanchester and Brington, Hunts.

Restaurant and Factory Lighting

A LONDON restaurant and a yarn factory in South Wales provide subject matter for new lighting installations which have come to our notice this week. Both systems were designed and fittings supplied by Thorn Electrical Industries Ltd. The illuminating engineer is confronted with numerous problems when attempting the use of fluorescent lighting in a restaurant, chief among which are probably colour and aesthetics. A restful atmosphere



Left is the new lighting installation at a London restaurant, and (above) in a Cheshire yarn factory. Both were fluorescent schemes, all fittings being supplied by Thorn Electrical Industries Ltd.

is the aim of most restaurant proprietors, and the achievement of this largely depends on the lighting engineer.

Thorn's claim to have overcome this aesthetic problem to a large extent at the S.F. Grill and Restaurant in Denman Street, W.1, where the main system is based on aluminium frames glazed with peach Veneeropal. Cross beams have been used as cut-off baffles and the width of the frame has been adjusted to give cut-off of the frame suspension and the lighting equipment. Batten type units of three sizes have been used, employing "Quickstart" control gear; and incandescent lamps in a concealed wall feature and within canopies over individual tables, provide subsidiary lighting.

Over 1,150 fluorescent fittings were used in the lighting of the workshops and corridors of Brocklehurst Yarns Ltd., near Cardiff. Industrial fittings have been mounted in continuous lines above the machinery and open top units allow a proportion of light to be thrown on to the ceiling. With the exception of corridor lighting "Quickstart" control has been employed throughout.

Open Day at the N.P.L.

INDUSTRIAL representatives will be invited to visit the National Physical Laboratory at Teddington on two "open days"—Monday and Tuesday, May 28 and 29.

Held this year in conjunction with the Festival of Britain, these open days are an opportunity for scientific and technical workers in industry to see the types of scientific research work and investigation carried out at the Laboratory.

The N.P.L. will be open on each of these days, from 10.30 a.m. till 5.30 p.m. and luncheon and tea may be obtained on the premises.

Tickets are being reserved for postal application from accredited representatives. Those interested should apply to the Director, National Physical Laboratory, Teddington, Middlesex, not later than May 8, indicating on which of the two days they would prefer to visit the Laboratory.

I.R.E. Graduateship Exam

THIS year's graduateship examination of the British Institution of Radio Engineers will take place on May 16, 17 and 18. Arrangements have been made for 234 overseas candidates to sit the exam at centres in Australia and New Zealand, India and Pakistan, Canada, South Africa, Malaya and Guatemala. Home candidates are advised that entries must be sent to the I.R.E. before April. Details of the exams and specimen papers may be obtained from the Secretary, 9 Bedford Square, W.C.1.

Licensing Control

EXPORT licences will in future be required for certain types of high pressure valves, compressors, blowers and fans and sulphur burners under a recent order made by the Board of Trade. The Export of Goods Control (Amendment No. 3) Order 1951 came into force last Monday and is obtainable from H.M.S.O.

Firm occupies two New Factories

DUE to the growing demand for their products, the British Rototherm Co., Ltd. have recently had to expand their premises. We note that they have occupied a new three-storey building extension to their Merton Abbey factory and also acquired a large factory at Nottingham. Both these new premises have been equipped with modern machinery for the production of the company's dial thermometers for indicating, controlling and recording temperature.

An Electric Farm

ONE of the features at the Royal Highland Show at Aberdeen in June will be an electric farm exhibited by the North of Scotland Hydro-Electric Board and E.D.A. The intention is to show the latest developments in the use of electricity on the farm and all equipment will be seen operating in buildings and surroundings approximating to conditions on a normal farm. Biggest building will house a complete dairy powered by electricity, and a special section will deal with farmhouse kitchen and laundry equipment.

Progress in Production

IN our issue of February 22 we published an article dealing with the 1950 production of Ferguson Pailin. Due to an error, the rating of the indoor cellular types of switchgear was given as "up to 740 VA," this should have read "750 MVA." The caption to the photograph of the VTLP.10 unit was also incomplete and should have included the additional word "service."

A model of the electric farm to be exhibited at the Royal Highland Show, Aberdeen, by the North of Scotland Hydro-Electric Board and E.D.A.

NEWS IN BRIEF

As we go to press, it is announced that the rate of pay for electricians is to be increased, as from April 2, by 4d. per hour in Grade A area, and 3d. per hour elsewhere.

Bull-dozers recently got to work on levelling the 10-acre site at Barugh Green, near Barnsley, for Brook Motors Ltd.'s new factory. A new winding department is envisaged for motors from ¼ to 50 h.p., and it is likely that the new "Z" range of control gear will also be made there.

The Union Geodesique et Geophysique Internationale has invited U.K. manufacturers to take part in the Exhibition of Scientific Apparatus at Brussels from August 20 to 31. Atmospheric electricity will be among subjects covered by the exhibition.

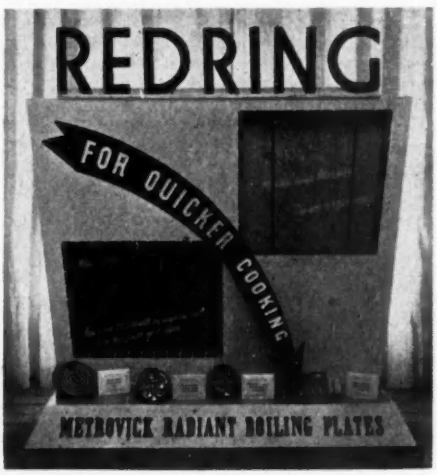
Over 500 spectators packed the canteen at Telcon's works for the open tournament staged by the company's Amateur Boxing Club. The club is in its second season and a varied programme of 15 bouts provided good entertainment and some interesting boxing.

I.S.M.A.'s Qualifying and Final examinations in "Sales Management" will be held this year on May 24, 25 and 26. Entry forms may be obtained from the Secretary, 4 Holborn Place, W.C.1.

The Scientific Film Association has organised a conference on "The Use of Films in Training for Industry." It is to be opened at St. Anne's-on-Sea (Lancs) on March 30. Details may be obtained from the Association at 4 Gt. Russell Street, W.C.1.

Television viewers last Saturday saw examples of the earliest domestic electric appliances, when the B.B.C.'s Joan Gilbert interviewed Mr. Charles W. U. Truefitt, the organiser of the Ideal Home Exhibition. The museum pieces included a "sausage" lamp of about 1908 vintage which was used in electric fires at that time, an Edwardian model of a Jackson electric cooker, and one of the first vacuum cleaners made by the British Vacuum Cleaner and Engineering Co., Ltd. Viewers were able to compare the appliances with their modern counterparts, to be shown on E.D.A.'s stand at the exhibition.

The S.W. Scotland Electricity Board has recently completed a programme of sales training courses which started last November. Subjects dealt with included industrial supplies, consumer service publicity and lighting. Service centre assistants and demonstrators and housecraft advisers attended five and three-day courses respectively while commercial officers' assistants had two-day courses.



One of two new "Redring" window displays made available by Metropolitan-Vickers for use by electrical retailers with large display windows

Questions in Parliament

Metal Stocks

The Minister of Supply was asked to give the stocks of virgin copper, zinc, tin, and of refined lead at the end of December, 1950, and January, 1951. He said U.K. stocks of these materials at the end of last December were 104,330, 36,256, 8,751 and 61,687 tons, respectively. For the end of January, the corresponding figures were 101,457, 36,186, 9,324 and 54,591 tons.

Nationalised Industries-Statistics

Asked to what extent he intended to obtain, under the Statistics of Trade Act, data in respect of the individual offices of the nationalised gas and electricity industries, Mr. Rhodes said most of this statistical information for the 1950 Census of Production and Distribution was being collected by the Minister of Fuel and Power, the forms prepared having been extended to include the required information. The data was largely supplied by area and divisional offices of the industries and included reference to individual productive and distributive units.

Smoke Pollution

On a motion of adjournment, Mr. A. Greenwood raised the matter of smoke pollution, quoting Dr. Parker, Director of Fuel Research for the D.S.I.R., as estimating that of the 190 million tons of coal burned in 1948, 7,250,000 tons went into the air in the form of 2 million tons of tarry smoke, over 300,000 tons of grit and 4,750,000 tons in the form of sulphur. Mr. Greenwood alleged that the deposit of solid matter from the air varied from 10 tons/sq mile/year in rural areas to as much as 2,000 tons/sq mile/year in the worst industrial areas. Commander Noble then referred to the situation in London, stating that some organisations had taken much trouble in the matter. At the Lots Road power station, the London Transport Executive had fitted plant which was now completed. The B.E.A., too, were taking like action at Barking power station, but he doubted whether the gas works were taking similar steps. Replying, the parliamentary secretary to the Minister of Fuel and Power, remarked that smoke abatement and fuel economy went hand in hand. It was possible for local authorities to take special powers by a local Act. Coventry was the first to put into operation a smokeless zone—Manchester's does not take effect till 1952. But many cities had grown higgledy-piggledy. Where factories were sparsely spread in the area and where a change of power was practicable, negotiations were undertaken with the people concerned as to whether or not they would change over to smokeless solid fuel, gas or electricity.

Yorkshire Board's Unlicensed Work

In a written reply to Mr. Kaberry, regarding unlicensed building work at the offices of the Yorkshire Electricity Board at Bramhope, near Leeds, the Minister of Fuel and Power stated that it had been found that work, valued at £3,250, which should have been authorised had been done without that approval. He claimed, however, that it would have been authorised if the Board had made application. Unfortunately, the officers of the Board made the same kind of mistake as they made at Scarcroft, in that they failed to apply for authorisation of work to be done with existing materials or with their own labour, and treated as repairs work that technically ought to have been regarded as new construction. Altogether work valued at £10,205 had been done at Bramhope.

Electric Supply News

Cardiganshire

The Minister of Fuel and Power has informed Cardiganshire County Council that he is unable to find any grounds to justify their request for a modification of the existing boundary across Cardiganshire which marks the supply areas of the South Wales Electricity Board and the Merseyside and North Wales Electricity Board. The Council is to ask the Minister for an assurance that an adequate supply of electricity be provided for the southern part of the county at charges not greater than those made by the Merseyside and North Wales Electricity Board.

Colyton

This Devonshire privately owned electricity undertaking is due to be taken over by the South-Western Electricity Board at the end of this month. It was in 1921 that Mr. F. Hann, a local timber merchant, decided to have a supply of electricity in his house and mills. The experiment was so successful that many neighbours also wanted a supply. Mr. Hann started his company, using a water-driven turbine to supply 20 consumers. Later two diesel engines were added, and now over 400 consumers are connected.

Easington (Co. Durham)

Developments have followed the R.D.C.'s protest to the Ministry of Fuel against poor electricity supplies from the network still controlled by the National Coal Board. It has been decided that where practicable, non-statutory network will be connected to the B.E.A.'s high voltage system at South Hetton, Shotton Colliery, Wingate North, Thornley, Horden, Easington, Grant's Houses and Deaf Hill.

Exmoor

It had been found impracticable to include the whole or part of the Exmoor area in the South Western Electricity Board's capital programme in the next financial year, Dulverton R.D.C. were told last Friday. The Board stressed that the cost

of providing a supply would be prohibitive compared with the return expected.

Gateshead

The Town Council is in conflict with the B.E.A. regarding the proposed diversion of a 66 kV grid line which runs diagonally across the proposed Leam Head housing estate. The Council contends that if the line is left in its present position it will mean that 140 houses will have to be eliminated from the housing scheme. The Council also contends that the installation is unsightly, and has proposed that the line be diverted or placed underground. Both proposals have been rejected by the B.E.A.

Inverness

Following a request by the local M.P. for details concerning the operation of the Inverness steam generating station, the North of Scotland Hydro-Electric Board has stated that the station was in use during December and the early part of January. But as coal cost represents 1¼d. p.u. at the station, it was shut down immediately the plant position eased.

Northern Ireland

Experiments in connection with the proposal to generate electricity in Northern Ireland by wind-driven turbines are at present being carried out there, sponsored by the Ministry of Commerce. Tests of wind velocities have been made at possible sites with a new type of generating plant. The sites include the Divis Mountain, where trials have already been undertaken. It is believed that this area is one of the best locations in the U.K.

Additional capital expenditure of £1,700,000 which would give electricity supplies to 10,000 more rural dwellings has been sanctioned by the Northern Ireland Electricity Board, it was stated in Stormont, last week. Capital expenditure on rural development during 1950 amounted to approximately £591,000. Against 148 miles of high tension lines erected in 1949, 220 were erected last year. Of the 7,800 consumers connected last year, more than 4,000 were rural. There were 595 farms connected, bringing the total number of farms connected to 3,474.

LIGHTING SCHEMES

Boldon (Co. Durham).—U.D.C. has received M.o.T. approval to the spending of £6,750 on improved street lighting.

Heywood.—T.C. applying for consent to replacement of street gas lamps with electric lighting, at an estimated cost of £15,000.

Maryport.—The T.C. has approved the installation of electric street lighting on the Ewanrigg Hall estate.

Newbiggin.—U.D.C. applying for sanction to borrow £6,326 for first section of street lighting scheme.

South Shields.—The Entertainments and Catering Committee has decided to withdraw the £10,000 put in the annual estimates, for the cost of illuminations.

Standish-with-Langtree.—First half of the U.D.C.'s main and trunk road lighting scheme has been approved by the M.o.T. Application is to be made for consent to borrow £2,400 for installing 250-watt lamps in Chorley Road.

Stockton-on-Tees.—The T.C. is recommended to include in its estimates £4,500 for 80 W mercury vapour lighting on Roseworth estate.

Developments in the Highlands

A new power development scheme (constructional scheme No. 32), announced by the North of Scotland Hydro-Electric Board, will utilise the waters of Loch Shin and tributaries, the River Cassley, the River Brora and other streams in the county of Sutherland, for the annual production of about 167 million units. One main and five subsidiary power stations, with a total capacity of 44,000 kW will be erected. The main one, to be on the north shore of the Kyle of Sutherland near Linsidemore, will be of 25,000 kW capacity, and will use water fed through a five-mile tunnel from Loch Shin, which with a dam 1,125 ft long and 39 ft high at Lairg, will be enlarged to provide 10,300 million cu ft storage capacity. One of the subsidiary power stations, the Tirry, of 1,750 kW, will be built near West Shinness Lodge, and draw water from the River Tirry and tributaries. Also on the north shore of Loch Shin is to be the Fiag station, of 1,000 kW, fed by water led by aqueduct from the River Fiag. On the southern shore of the Loch, the Cassley station, of 3,750 kW, will operate on a head of 371 ft. To the north west, a dam is to be built to enlarge Feur Loch, together with an aqueduct, and a 1,000 kW power station on the southern shore of Loch Merkland. The fifth small station, Ben Hee, of 5,000 kW, is to be on the opposite side of Loch Merkland. Cost of this project is estimated at £8,000,000.

Another scheme just announced (Scheme No. 59), is for a new diesel generating station at Wick, which will more than double the plant capacity in Caithness. This new station will have six 600 kW diesel sets, and will cost £157,120. It is necessitated by the great increase in demand in the county. The Board has already increased the capacity of the existing station at Wick to 1,880 kW, and that at Thurso to 1,043 kW.

A further constructional scheme (No. 56) of the North of Scotland Hydro-electric Board has now been approved by the Secretary of State for Scotland. This scheme provides for the construction of a diesel generating station of about 6,000 kW at Stornoway, to supply that town and throughout the island of Lewis. Estimated cost of the scheme is approximately £336,000.

Company Activities

Associated Electrical Industries Ltd.

In addition to recommending an increased dividend for 1950, the directors have also made proposals for the issue of shares to employees in the group. The final dividend is 15% (*10%*), payble on April 10, making the total for the year 20% (*15%*). Group trading profit for 1950 is £8,440,000 as against £7,602,000 in 1949, and with other income added the sum becomes £8,605,000 (*£7,762,000*). Interest on the 10-year rates absorbs £130,000 (*£101,000*), depreciation £810,000 (*£913,000*), various provisions £243,000 (*£30,000*), U.K. taxation £3,960,000 (*£3,519,000*), leaving a balance of £8,605,000 compared with £7,762,000 for 1949. The sum set aside for increased replacement cost of fixed assets is £950,000 (*£500,000*), leaving a balance of £2,496,000 (*£2,688,000*) of which £2,157,000 (*£2,273,000*) relates to A.E.I. Ltd. An extraordinary general meeting is to be held to consider the capital proposals, (a) to reduce the cumulate rate of dividend on the £2,669,240 Preference stock from 8% to 4½%, (b) in return these stockholders will be offered the right to subscribe for 800,772 Ordinary shares at £1, in the ratio of 3 Ordinary for £10 of Preference stock held, and (c) to offer 330,760 new 4½% Cumulative Preference shares at 20s. each to present Preference stockholders. In addition it is proposed to issue to employees, who number over 55,000, 699,228 Ordinary shares at 40s. share, in order to give them a proprietary interest in the company. Large applications for shares will be scaled down so as to allow small applicants, as far as possible, to obtain allotment in full. These shares, by the way, are being currently quoted at 90s. 6d.

Barbados Electric Supply Corpn., Ltd.

For the year to June 30 last, trading profit amounted to £37,728, as compared with £37,112 in the previous year. After allowing sundry expenses and £11,000 (*same*) for depreciation, the balance is £22,207 (*£21,650*). The Preference dividend takes £4,258 (*nil*), taxation £8,500 (*£10,500*), and the Ordinary dividend of 5% tax free £10,000 (*same*).

Cables and Wireless (Holding)

Group income (gross) from investments was £1,048,227, from property £120,681, and other income £78,648, making £1,247,556 (*£3,242,852 including £2,087,825 interest (gross) from H.M. Treasury*). After deducting all charges, including taxation £405,290 (*£1,107,974*), the net profit was £434,423.

International Combustion (Holdings) Ltd.

For the year to September 30, the group profit is £907,612—an increase of 54% on the 1948-49 figure—with a net profit of £376,264 as against £244,206 in the previous 12 months. U.K. taxation absorbs £531,348 (*£345,073*). The final dividend is 15%, making 20% on the £879,245 Ordinary capital in issue since the 150% scrap bonus of 1949. For the previous year, the company paid the equivalent of 15% on the increased capital.

Reliance-Clifton Cables and Industrial Products Ltd.

Meetings are to be held on March 12 to consider the proposal to convert the existing three issues of Preference stock into a single class carrying the right to a fixed cumulative dividend of 5% p.a. It is proposed that the conversion should operate from April 1 next, dividends at existing rates being paid to March 31 in the usual way.

Dividends Declared

Brown Brothers Ltd. Final Ordinary dividend 10% (7½%), making 12½% (*10%*).

Bruce Peebles and Co. Ordinary dividend 12½% (*10%*). Net profit is £112,879 (*£115,229*).

Crabtree Electrical Industries. Interim of 5% (*same*).

Crabtree Electrical Industries Ltd. Interim Ordinary dividend 5% (*same*).

E. K. Cole Ltd. Interim Ordinary dividend is 10% (*8%*).

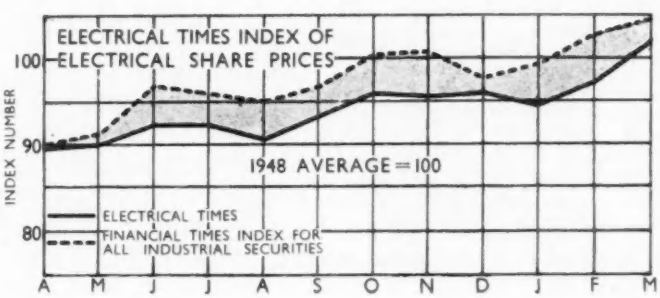
Lancashire Dynamo Holdings. Final Ordinary dividend 10% and bonus 7½% on enlarged capital, making 22½% (*same*).

Midland Electric Manufacturing Co. Dividend of 15% (*12½%*). Net profit is £162,485 (*£138,619*).

Morphy-Richards. Interim of 15% (*same*).

R. B. Pullin. Dividend of 15% (*10%*).

Singapore Traction. Two years' arrears of 7% Cumulative Preference to be paid on March 13.



Electrical share prices continued to rise during February. By the end of the month the Electrical Times *index figure topped the hundred, reaching* 102·5. *The* Financial Times *index for all industrial Ordinary shares also continued its upward trend reaching* 104·3. *These figures are based on the average prices ruling during* 1948.

Commercial Information

CONTRACTS OPEN

HOME

Mar. 9.—Bournemouth. Installation of No. 2 electric lifts at Town Hall. Borough Architect, Town Hall. Deposit £2 2s.

Mar. 9.—Chester. Electrical installation and wiring of Two Stream infants' school at Blacon. Applications to be lodged by above date to City Engineer and Surveyor, Municipal Offices, 43 Northgate St., Chester. Deposit £2 2s. (See March 1 issue.)

Mar. 9.—Dublin. Electrical installation at Post Office Stores, Infirmary Rd. J. Tyrrell, Secretary, Office of Public Works. Deposit £1.

Mar. 9.—Kilwinning T.C. Tenders invited for street lighting of Trunk Road A.78 with sodium vapour discharge lamps. Burgh Surveyor, Council Chambers, Kilwinning. (See Feb. 15 issue.)

Mar. 10.—Brighouse T.C. 130 concrete columns, 20 brackets for attachment to existing poles and 150 h.p. m.v. lanterns and fittings, for the Bradford-Huddersfield Road A.641. Borough Engineer, Commercial Street, Brighouse. Deposit £1.

Mar. 10.—Keighley T.C. Fluorescent lighting of public abattoir, Hard Ings Rd. Abattoir Superintendent, Health Dept., Lowfield House, North St.

Mar. 10.—Mablethorpe and Sutton U.D.C. Supply and erection of vertical spindle centrifugal pump driven by electric motor. Pump must be capable of lifting 20,000 g.p.h. Consulting Engineers, Silcock and Simpson, 10 Park Row, Leeds 1. Deposit £5.

Mar. 10.—Sunderland T.C. Electrical installation in 346 houses on Hylton Red estate. Borough Architect, Grange House, Stockton Rd. Deposit £2 2s.

Mar. 12.—Belfast. Two electrically heated food trolleys required for Royal Victoria Hospital by N. Ireland Hospitals Authority. Documents from the Hospital's Purchasing Officer.

Mar. 12.—Dublin. Supply and installation of internal telephone system in Town Hall, Ballsbridge. Documents from Town Hall, Merrion Rd., Ballsbridge.

Mar. 12.—Dublin. One 100/6G rectifier bulb for Hewittic mercury arc rectifier. Tenders to City's Vocational Education Committee, Town Hall, Merrion Rd., Ballsbridge, Dublin.

Mar.12.—Macclesfield. Hospital Management Committee invites tenders for supply of electric lamps and fittings for year ending Mar. 31, 1952, to hospitals in their group. Applications to Secretary, The Macclesfield Hospital West Park Branch.

Mar. 12.—Manchester. Electrical installation in Hollyhedge Rd. branch library, Wythenshawe. City Architect, Town Hall. Deposit £1 1s. (See March 1 issue.)

Mar. 13.—Devizes T.C. Supply, erection and installation of 132 street lighting columns and lanterns on certain roads. J. D. Sheasby, borough surveyor and water engineer, The Chequers, Devizes. Deposit £2 2s.

Mar. 13. — Newcastle-under-Lyme T.C. Supply and installation of lanterns, lamps and control gear, plus concrete standards for approx. ¾ mile in Bradwell Lane. Sodium discharge lamps, 140 W horizontal burning, are specified. Borough Engineer and Surveyor, Lancaster Building, Newcastle, Staffs. Deposit £2. (See March 1 issue.)

Mar. 14.—Rowley Regis (Staffs) T.C. Supply of electricians' requisites for year beginning April 1. Tenders to R. Hegan, Town Clerk, Municipal Bldgs., Old Hill, Staffs.

Mar. 15.—Belfast. S. Belfast Hospital Management Committee requires supply of electrical engineering materials to Belfast City, Musgrave Park and Malone Place Hospitals for year ending Mar. 31, 1952. Supplies Officer, Belfast City Hospital.

Mar. 15.—Southampton. Electrical installation in Beech Ave. junior school. Applications to Borough Architect by Feb. 28. Deposit £5. (See Feb. 22 issue.)

Mar. 16.—Belfast. Tenders invited for 6·6 kV and lower voltage cabling, with ancillary works. Electricity Dept., East Bridge St., Belfast. Deposit £2 2s. (See Feb. 22 issue.)

Mar. 16.—Cannock U.D.C. Supply, erection and installation of street lighting along (*a*) trunk road A34, 92 140 W sodium and ten 80 W fluorescent; (*b*) Class 1 A460, 19 140 W sodium and three 80 W fluorescent; (*c*) Class 2 B5013, 37 140 W sodium and five 80 W fluorescent. Council's Engineer and Surveyor, E. Lomax, Council House, The Green, Cannock. Deposit £5 5s.

Mar. 16.—Hawick T.C. Electrical installation in erection of a block of six houses in Gladstone St. Office of Burgh Surveyor, Hawick.

Mar. 16.—Norton R.D.C. Electrical installation in 10 houses in Rillington. Council's Architects, Anderson and Allen, 32 Nicholas St., Scarborough.

Mar. 16.—Sittingbourne and Milton U.D.C. Supply, erection and installation of (*a*) Class A lighting on trunk road A2, comprising 96 400-watt mercury vapour lamps on concrete columns, and (*b*) Class A and B on estates comprising 42 250-watt mercury vapour lamps, and 31 80-watt of same. Engineer and Surveyor, High St., Sittingbourne. Deposit £3 3s. for (*a*) and £2 2s. for (*b*). (Advertised in this issue.)

Mar. 19.—Windsor T.C. Electrical installation to eight houses on Dedworth Manor Central site. Borough Engineer, Kipling Memorial Building, Windsor. Deposit £1 1s.

Mar. 20.—Darwen (Lancs) T.C. Supply and installation of lanterns and control gear along A666 and in town centre. Three 80-watt fluorescent lighting in latter and 140-watt sodium vapour lighting along about three miles of A666. Borough Engineer, T. H. Ivinson, Town Hall. Deposit £2 2s.

Mar. 21.—Hawick. Electrical installation in conversion of Weens Mansion House. J. P. Alison and Hobkirk, architects, 45 Bridge St.

Mar. 22.—Cuckfield (Sussex) R.D.C. Installation of electricity in existing council houses on seven different sites. Engineer and Surveyor, A. Hutchings, Rural Council Offices. Deposit 10s. 6d.

Mar. 23.—Ulster. Supply of steel conduit and fittings for electric wiring, cables and electric lamps for year ending March 31, 1952. Stores Superintendent, Duncrue St., Belfast. Charge of 1s. for each tender form.

Mar. 24.—Edinburgh. Installation of electric light in alterations of Canongate/Tolbooth property. Also rewiring of City Chambers. Separate contracts. Office of City Architect, City Chambers.

Mar. 24.—Bradford. Supply and installation of new switchgear and wiring at Dumb Mills, Frizinghall, and dismantling and removal of redundant portions of existing switchgear. City Engineer and Surveyor. Deposit £2 2s. (See Feb. 22 issue.)

Mar. 30.—Belfast. Re-plating of lead-acid storage battery. Electricity Dept., East Bridge St., Belfast. Deposit £1 1s. (Advertised in this issue.)

April 4.—Wandsworth. Supply and delivery to Tooting Depot, Greaves Place, of 10,800 ft of 3·029 S.W.G. armoured cable in various lengths of between 2 and 12 core cable. Borough Engineer, Surveyor, and Architect, Municipal Bldgs., S.W.18. (Advertised in this issue.)

No date stated.—Rothwell (Yorks) U.D.C. Wiring for electricity of 49 houses at Methley. Housing Manager, Civic Bldgs., Rothwell, Leeds.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Mar. 22.—S. Rhodesia. Electricity Supply Commission wants supply of rural, distribution and power transformers. B.o.T. (Ref CRE (IB) 54546/51).*

Mar. 26.—Egypt. Supply and delivery of v.i.r. cables, 250 V and 260 V, for wiring of buildings. Specifications, etc. from Chief Inspecting Engr., Egyptian Govt., 41 Tothill St., S.W.1. Deposit £2 1s. (Advertised in this issue.)

Mar. 28.—Queensland. State Electricity Commission requires one 500 kVA, 6,600/415/240 V transformer and two 500 kVA 11,000/2,200/415/240 V transformers. Tenders to secretary of Commission at Scottish Union House, Eagle St., Brisbane.

Mar. 29.—Uruguay. Supply of electricity meters, a.c., for three wire distribution network without neutral, for Usinas Electricas y Telefonos del Estado. B.o.T. (Ref. CRE (IB) 53809/51).*

April 19.—Sydney. Supply of high voltage testing equipment: one testing transformer with one-hour output rating of 100 kVA, one induction regulator and one control switchboard, for Sydney County Council. B.o.T. (Ref. CRE (IB) 54890/51)*.

May 15.—Wellington (N.Z.). Supply of 440 suspension strings of extra h.t. insulators and 60 strain insulator strings of extra h.t. insulators. Stores Manager, State Hydro-Electric Dept., Box 25, Govt. Buildings. B.o.T. (Ref. CRE (IB) 54952/51)*.

May 31.—Brisbane. Three 1,500 kVA indoor transformers, 5,000 to 415/240 V for City Electric Light Co., Ltd., Boundary St., Brisbane. B.o.T. (Ref. CRE (IB) 54881/51)*.

CONTRACTS PLACED

B.E.A. Supply of 132 kV 2,500 MVA switchgear for Connah's Quay power station, and 33 kV 1,500 MVA switchgear for Northampton power station, Ferguson Pailin Ltd.; 132 kV 2,500 MVA switchgear for Staythorpe substation, General Electric Co., Ltd.; 132 kV line from Canterbury to Northfleet, W. T. Henley's Telegraph Works Co., Ltd.; 132 kV line from Bonnybridge to Bathgate, J. L. Eve Construction Co., Ltd.; 132 kV and multicore cable for Portishead, British Insulated Callender's Cables Ltd.; and 33 kV 750 MVA switchgear for Fleetwood power station, English Electric Co., Ltd.

Ely. Electrical installation at Tower House Hospital for East Anglian Regional Hospital Board. P. H. Allin and Sons, Cambridge, £4,242.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Alite. With design. B670,777. Class 11. Electric lamp bulbs for motor vehicles. Associated Lighting, Ltd., Lower house Mills, Bollington, Macclesfield.

His Master's Voice. 690,557. Class 9. Apparatus, instruments and devices for the recording, reproduction and transmission of sound; television transmitting and receiving apparatus etc. Gramophone Co., Ltd., Blyth Rd., Hayes, Middx.

Infrasafe. 694,542. Class 11. Electrical heating apparatus. Harold E. Scotton, "Bedruthen" Faire Rd., Glenfield, Leics.

Norcraft. 693,895. Class 11. Lampshades and wire frames being parts of lampshades. Handcraft Supplies (Northern), Ridley Place, Newcastle-upon-Tyne.

Willett Bruce. B663,774. Class 9. Audible signalling apparatus for use in maritime navigation, etc. Chadburns (Liverpool) Ltd., Park Lane, Aintree, Liverpool.

Your Queries — Answered

"Tomlinson" washboilers, makers of? T.B.—F. J. Tomlinson Ltd., Hall Carr Mill, Rawtenstall, Lancs. (19497)

"Octopus" growlers, makers of? E.B.—Armature Mfg. Co., Rushbank Electrical Works, Burnley St., Middleton Rd., Oldham. (19513)

"Moon" electric kettle, makers of? T.E.—Martins Metal Industries Ltd., 121 Kingsway, W.C.2. (19519)

"Separka" vacuum cleaners, makers of? A.H.—We presume this refers to the "Noseparka" made by S.E.P. Ltd., 4 Eden St. Kingston-on-Thames. (19532)

E.T.E.I. Ltd., address of? R.M.—This refers to Ernest Turner Electrical Instruments Ltd., Chiltern Works, Totteridge Ave., High Wycombe. (19538)

"Gecko" coffee percolators, makers of? W.E.—Gee's Engineering Co., Ltd. Tyburn Lane Works, Harrow. (19546)

The above are selected from questions we have answered this week. If you have a query, send it to us.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Cooper and Co. (Shrewsbury) Ltd., 15 Ellesmere Rd., Shrewsbury, Salop. Electrical engineers and contractors, etc. Cap.: £1,000. Dirs.: G. A. Cooper and Mrs. I. Cooper.

Crystal Spray Co. Ltd., 2 South Audley St., Mayfair, W.1. Engineers, electricians, etc. Cap.: £100. Dirs. to be appointed by subs. Subs.: R. Tilea and F G. Rayneau.

E. Dawson (Branches) Ltd., 1 Lincoln's Inn Fields, W.C.2. Wholesale suppliers of electrical apparatus, electrical engineers, manufacturers and repairers, etc. Cap.: £8,000. Dirs.: C. H. Blackburn and A. H. Body, W. Taylor and A. S. Wraight.

Rola Celestion Ltd. Manufacturers and dealers in electro-acoustical, acoustical and sound-producing articles, etc. Cap.: £1,000. Dirs. to be appointed by subs. Subs.: G. K. Ireland and L. Cork (solicitors), 20 Copthall Av., E.C.2.

Truvox Holdings Ltd. Manufacturers of and dealers in electro-acoustical, acoustical and sound-producing articles, etc. Cap.: £1,000. Dirs. to be appointed by subs. Subs.: G. K. Ireland and L. Cork (solicitors), 20 Copthall Av., E.C.2, and 5 others.

Truvox Ltd. Manufacturers of and dealers in electro-acoustical, acoustical and sound-producing articles, etc. Cap.: £1,000. Dirs. to be appointed by subs. Subs.: G. K. Ireland and L. Cork (solicitors), 20 Copthall Av., E.C.2.

TRADE NOTES

Agreement. L. Sterne and Co., Ltd., and Tecumseh Products Co., Inc., of Michigan, have reached an agreement for the exchange of interests, data and personnel. The Tecumseh company takes over the older arrangement between L. Sterne and Co., Ltd., and the Universal Cooler Company of America following on the absorption of the latter firm by Tecumseh. The arrangement will give Sterne's the benefit of technical developments originating in the U.S.A. and will particularly assist them in the production of hermetically sealed refrigeration units and in the production of small automatic units.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	202 0 0	£196 0 0
Delivered in 2nd and 3rd month after order ...	215 10 0	—
Delivered in 4th, 5th and 6th month after order	217 0 0	—
LEAD, good soft pig (foreign)	136 0 0	136 0 0
,, ,, ,, "English" quality	137 10 0	
Delivered in 2nd and 3rd month after order, plus	7 0 0	
TIN (99-99.75%) (Cash)	1455-1465	—
,, (3 months)	1320-1325	—
ALUMINIUM, commercial purity (del.) ...	124 0 0	—
ZINC	151 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	46 10 0	—
Mild Steel Tape (0.04 in.)	26 10 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

L. Bunce (Electrical) Ltd. Meetings of members and creditors will be held at 196 Wolverhampton St., Dudley, on April 3 at 2.30 and 2.45 p.m. respectively, to receive liquidators' report.

Exchange Battery Service Ltd. Petition for winding-up presented at Manchester County Court on Feb. 19 and is to be heard at that court on April 4. Interested persons should communicate with Slater, Heelis, Harris and Co., District Bank Buildings, School Rd., Sale, by April 3.

Corwen Electric Light Co. Ltd. Resolution for voluntary winding-up passed at meeting on Jan. 30. Charles Lee Morris, Caxton House, Corwen, appointed liquidator.

Green Electrical and Engineering Co., Ltd. Meeting of creditors to be held at 35 Burley St., Leeds, on March 14 at 2.30 p.m.

Leigh Electric Co., Ltd. Creditors to send particulars to Owen G. Harvey of 70 Victoria Rd. North, Southsea, Hants., who has been appointed liquidator, by March 19.

Llanfair Caereinion Electric Society Ltd. Creditors are required to send particulars to liquidator, A. Harold Morgan, Incorporated Accountant, Crown Chambers, 18 Market St., Newtown, by March 23.

Premier Electric Services Ltd. Resolution for voluntary winding-up passed at meeting on Feb. 20. Ralph A. Haigh, Court Chambers, Friar Lane, Leicester, has been appointed liquidator, to whom creditors should send particulars by April 14.

First Meeting

Manchester. Ingham and Owen Ltd., electrical contractors, of 46 Stockport Rd., Levenshulme. Meetings of creditors and contributories at Official Receiver's Office, 20 Byrom St., Manchester, on March 8 at 11 and 11.30 a.m.

Voluntary Liquidation

Premier Electric Services Ltd., electrical contractors, Leicester and Great Yarmouth. At a meeting of creditors, statement of affairs showed liabilities amounting to £14,215 14s. 6d. Assets were estimated to produce £4,561 11s. 10d., and after allowing £3,195 13s. 1d. for preferential claims, there were net assets of £1,365 18s. 9d., or a deficiency of £12,849 15s. 9d. The company was registered in 1936 with capital of £2,500. Resolution passed confirming voluntary liquidation with Mr. R. A. Haigh, C.A., Court Chambers, Friar Lane, Leicester as liquidator, with a committee of inspection.

BANKRUPTCY ACTS

Release of Trustee

Birmingham. George H. Payton, electrical contractor, trading at 157-159 King Edward Rd., Ladywood. Trustee was William Le'Resche Hand, Fletchers Chambers, Fore St., Birmingham 2.

Intended Dividend

Gt. Grimsby. John Vincent Depledge, electrical contractor, trading at 108 Frodingham Rd., Scunthorpe. Last day for receiving proofs, March 14. Trustee is Leslie F. McCulloch, 26 South St. Mary's Gate, Grimsby, Lincs.

First Meeting

Hereford. Philip Thomas, trading as radio and electrical engineer at 4 New St., Ledbury. Meeting at Shire Hall, Hereford, on March 12 at 2 p.m. and public examination at same place on April 30 at 2 p.m.

BUSINESS PROSPECTS

Alnwick (Northumberland) U.D.C. 32 houses to be built on the Howling Lane East site.

Antrim R.D.C. Erection of 10 houses at Lisnevenagh and 6 each at Gortgarn and Staffordstown. M'Carthy and Lilburn, 47 Scottish Provident Bldgs., Donegall Sq. West, Belfast.

Barrow-in-Furness T.C. Erection of extensions to Risedale county secondary school. Borough Engineer and Surveyor, J. N. Flitcroft, Town Hall.

Batley T.C. Council to apply for sanction to borrow £60,600 for erection of 48 houses and 8 bungalows on Staincliffe estate.

Belfast. Erection of 88 flats on Skegoneill Ave. estate and 36 houses on Donegall Park Ave. estate. Housing Architect, 94 Chichester St.

Bingham (Notts) R.D.C. Erection of 16 houses at East Bridgeford and 12 at Radcliffe-on-Trent.

Birmingham. Proposed to erect a secondary modern school at King's Heath at estimated cost of £93,000. Architect is J. T. Lynch, 3 Church St., Brierley Hill.

Boldon (Durham) U.D.C. Plans approved for erection of 142 houses on Boldon site. Council has also received sanction to borrow £81,933 for erection of 42 bungalows and 42 houses.

Bolton T.C. Construction of primary school at Johnson Fold. Borough Engineer and Surveyor, Town Hall.

Bournemouth T.C. Construction of 15 bungalows at "Toft Steps," Undercliff Drive. Borough Architect, Town Hall.

Braughing (Herts) R.D.C. Erection of 10 houses at Braughing and 11 at Little Hadham. The Clerk, 2 Huckerill St., Bishop's Stortford.

Chapel-en-le-Frith R.D.C. Construction of 20 houses at Hayfield. Engineer and Surveyor, 27 Market St., Chapel-en-le-Frith, via Stockport.

Cork. Construction of technical school at Midleton. Architect, E. P. O'Flynn, 60 South Mall, Cork. Also erection of 154 houses at Spangle Hill. P. Monahan, City Manager and Town Clerk, Town Hall.

Drogheda T.C. Erection of 42, 35 and 51 houses under separate contracts at Glenview. J. Carr, Town Clerk, Court House, Drogheda.

Dundalk U.D.C. Erection of 51 houses at Castletown site. J. A. Smyth, Town Clerk, Town Hall, Dundalk.

Durham. Grenfell Baines and Hargreaves of Guildhall St., Preston, are the consultants for electrical work in the proposed new primary school at Birtley Brown Buildings. R. W. Gregory and Partners of Pilgrim House, Newcastle, have been appointed consultants for similar work at Shiney Row county school.

Durham. Council is to apply for sanction to provide electricity in 336 houses at Sherburn Rd. and Hatfield View. Scheme is estimated to cost £9,732.

East Retford T.C. Erection of 64 dwellings. Vallance and Westwick, White Hart Chambers, Mansfield, Architects to Council.

Essex. Approval is being sought for carrying out a £1,157,259 building and improvement programme in respect of numerous schools in the county.

Evesham T.C. Erection of 22 houses on Fairfield site. Architects, Pemberton and Bateman, 21 Vine St.

Falmouth T.C. Building of 21 houses on Marlborough estate. Borough Surveyor, Municipal Buildings.

Harrow U.D.C. Negotiations in hand with John Laing and Sons Ltd., Bunns Lane, N.W.7, for erection of 48 houses at Hatch End and 18 at Stanmore.

Hartlepool T.C. Construction of 51 houses at West View. R. H. Snowball, Borough Engineer and Surveyor, Borough Buildings, Middlegate, Hartlepool.

Liverpool. Erection of 96 flats at Speke. City Architect and Director of Housing, Blackburn Chambers, Dale St., Kingsway.

Newark-on-Trent T.C. Erection of 200 houses on the Hawton Rd. estate. Borough Surveyor, Municipal Buildings.

Oadby (Leic) U.D.C. Twenty flats are to be erected on St. Peter's Rise estate.

Padiham U.D.C. Construction of 16 bungalows on St. Giles' St. estate. W. R. C. Houston, Surveyor and Engineer, Town Hall.

Seaton (Devon) U.D.C. Construction of 20 houses on Sealwell Lane estate. R. Betterley clerk, 4 Seafield Rd.

Seaton Valley U.D.C. Tenders shortly to be invited for erection of 46 houses near Seghill station.

Sheffield. Erection of 91 houses on the Basegreen estate. W. Geo. Davies, City Architect, Town Hall.

Slough T.C. Erection of 37 blocks of flats on Priory estate, Burnham Borough Engineer, Town Hall.

South Shields T.C. Plans approved for construction of 36 flats in two blocks in Farding Square.

Spilsby. Work is shortly to start on the new £69,000 secondary modern school.

Tadcaster (Yorks) R.D.C. Erection of 28 houses at Micklefield. Anthony Steel and Owen, architects, 89 Albion St., Leeds 1.

Tendring (Essex) R.D.C. Conversion of huts to 36 dwellings. W. S. Laing, Engineer and Surveyor, Council Offices, Weeley, Nr. Clacton-on-sea.

Tynemouth T.C. Erection of 54 houses in Marden Central Development and at Balkwell Ave. Borough Surveyor, D. M. O'Herlihy, 16 Northumberland Sq., North Shields.

Wakefield T.C. Erection of 26 bungalows on the Eastmoor estate. City Engineer, Town Hall.

Wallasey T.C. Erection of Mount Rd. junior and infants' school. Borough Architect, Town Hall.

Whitefield (Lancs) U.D.C. Council to erect 20 houses near Elms Playing Fields and 8 maisonettes, and 6 bungalows at Welbeck Close.

Wigan T.C. Application to be made for sanction to borrow £159,886 for erection of 129 houses on the Norley Hall estate. Manchester Regional Hospital Board invite tenders for erection of new twin operating theatres at Royal Albert Edward Infirmary, Wigan. Thomas Duffy, Architect to Board, Sunlight House, Quay St., Manchester 3.

Wombwell (Yorks) U.D.C. Plans approved for erection of church in Park St. at estimated cost of £4,219.

MEETINGS TO NOTE

THURSDAY, MARCH 8

ASSOCIATION OF ELECTRICAL HOUSECRAFT ADVISORS.—Annual meeting at 35 Grosvenor Place, S.W.1, 7 p.m.

DUNFERMLINE ELECT. SOC.—"Post Office Automatic Systems." J. T. McLoughlin. Unitas Hall, Queen Anne St., 7 p.m.

I.E.E. (Cambridge Radio Group).—Annual dinner.

I.E.E. (N.E. Scotland sub-centre).—"Control of Hydro-Electric Plant." A. C. H. Frost and W. Brittlebank. Royal Hotel, Union St., Dundee, 7 p.m.

I.E.E. (Southern Centre).—Annual dinner-dance and visit of President. Polygon Hotel, Southampton, 7.30 p.m.

I.E.E. (Swansea sub-centre).—Informal meeting. Three short papers. Plaza Cinema, 6 p.m.

I.E.S. (Cardiff Centre).—"Problems Associated with Underground Lighting in British Coal Mines." D. A. Strachan. School of Mines, Treforest, 5.45 p.m.

I.E.S. (Leicester Centre).—"Hospital Lighting." M. W. Peirce and D. J. Reed. E. Midlands Elect. Boards, Charles St., Leicester, 6.30 p.m.

I.E.S. (Manchester Centre).—Members evening. Coll. of Technology, Sackville St., 6 p.m.

ENGRS. GUILD (Metropolitan Branch).—Discussion on "Engineer and the Public." Introduced by H. Nimmo, chairman, Southern Elect. Board, Caxton Hall, S.W.1, 6 p.m.

FRIDAY, MARCH 9

I.E.E. (E. Midland Centre).—Annual dinner and visit of President. Victoria Station Hotel, Nottingham, 6.45 p.m.

I.E.E. (Mersey and N. Wales Centre).—Dinner-dance at Reece's Restaurant, Parker St., Liverpool, 6.30 p.m.

I.E.E. (N. Ireland Centre).—Annual Conversazione at Grand Central Hotel, Belfast, 8.30 p.m.

JNR. INSTN. OF ENGRS. (London).—"Glass, Light and Designs." S. L. Lyons. 39 Victoria St., S.W.1, 6.30 p.m.

I.E.S. (Birmingham Centre).—Annual meeting. "Light and Vision." H. C. Weston. Imperial Hotel, Temple St., 6 p.m.

A.S.E.E. (Bristol Branch).—"Floodlighting." R. S. Hazell. Grand Hotel, 7.30 p.m.

A.S.E.E. (Crewe Branch).—"Illumination Design." S. D. Pryor. Crewe Arms Hotel, 7.30 p.m.

A.S.E.E. (Nottingham Branch).—"Automatic Sequence Control of Conveyors and Belt Protection." T. A. Peat. Electricity Showrooms, Smithy Row, 7.30 p.m.

MONDAY, MARCH 12

I.E.E. (N.E. Centre).—"Standardisation and Simplification in the Electrical Industry." J. T. Moore; "An Organisation for Internal Standardisation in a large Manufacturing Company." P. J. Daglish. Neville Hall, Westgate Rd., Newcastle, 6.15 p.m.

I.E.E. (London).—Discussion on "Electronic Power Control of Motors." Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (S. Midland Supply and Utilisation Group).—"Evolution of the Lighting Art." J. W. T. Walsh. Imperial Hotel, Birmingham, 6 p.m.

I.E.E. (N. Staffs sub-centre).—"Railway Electrification in G.B." C. M. Cock. Crown Hotel, Stone, 7 p.m.

I.E.E. (Rugby sub-section).—"Design and Performance of Surge Diverters for the Protection of a.c. Systems." T. F. Monahan; "Design of Power Transformers to withstand Surges due to Lightning." A. T. Chadwick, J. M. Ferguson, D. H. Ryder, G. F. Stearn. E. Midland Electricity Board Showrooms, High St., Rugby, 6.30 p.m.

I.E.E. (Western Centre).—"Some Experience with a British a.c. Network Analyser." G. Lyon. Electricity House, Colston Ave., Bristol, 6 p.m.

TUESDAY, MARCH 13

I.E.E. (London Measurements Section).—"Testing of Fine Wires for Telecommunication Apparatus." R. C. Woods and J. K. Martin. Also (with Radio Section) "Use of an Electrostatic Wattmeter for Magnetic-Loss Measurements." J. K. Choudhury and Arvon Glynne. Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (N.W. Centre).—"Education and Training of Electrical Technicians." J. W. Thomas. Engineers' Club, Albert Sq. Manchester, 6.15 p.m.

I.E.E. (N. Ireland Centre).—"Development and Design of Electrical Control Gear for Machine Tools." A. R. H. Thorne. Queen's University, Belfast, 6.45 p.m.

I.E.S. (Stoke-on-Trent Group).—"Illumination and Illusion." P. Hartill. 31 Kingsway, 6 p.m.

INCORP. PLANT ENGRS. (E. Lancs Branch).—"Installation and Maintenance of Fluorescent Lighting in Industry." F. C. Tyrrell. Engrs'. Club, Albert Sq., Manchester, 7.15 p.m.

I.E.E. (N. Midlands Students' Section).—"Research and the Electrical Engineer." Dr. K. J. R. Wilkinson. Lighting Service Bureau, Aire St., Leeds, 6.30 p.m.

A.S.E.E. (Bolton Branch).—"Thermal Storage Heating." Mr. Good. York Café, Gt. Moor St., 7.15 p.m.

A.S.E.E. (S.W. London Branch).—"Corrosion." G. E. D. Redman. St. George's Hall, St. George's Rd., Wimbledon, 8.15 p.m.

WEDNESDAY, MARCH 14

I.E.E. (Oxford).—"Use of the Synchrotron and Other Particle Accelerators in Atomic Research." C. H. Collie. Southern Elect. Board, George St., 7 p.m.

I.E.E. (Scottish Centre).—"Recent Developments in Comparative Methods of Testing a.c. Electricity Meters." S. F. Musson and R. E. Mell. Heriot-Watt College, Edinburgh, 7 p.m.

BRITISH INSTN. OF RADIO ENGRS. (N.E. Section).—"Acoustics." E. G. Richardson. Neville Hall, Westgate Rd., Newcastle, 6 p.m.

BRITISH INSTN. OF RADIO ENGRS. (S. Midlands Section).—"Transmitter for an Experimental 8 Channel Carrier Wire-Broadcasting System." R. G. Kitchenn. Public Library, Rugby, 7.15 p.m.

I.E.S. (Edinburgh Centre).—Annual meeting. Presidential address by L. J. Davies. Followed by annual dinner.

NORTHAMPTON ELECTRICAL ASSOC.—"Electroplating." A. F. Brockington, 7 p.m.

A.S.E.E. (Birmingham Branch).—"A.C. Commutator Machines." Chamber of Commerce, New St., 7 p.m.

A.S.E.E. (Bradford Branch).—"Application of Refrigeration." E. Hargreaves. Midland Hotel, 7.30 p.m.

A.S.E.E. (Kent Branch).—"Testing of the Earth and its Resistivity." H. Coulls. County Hotel, Canterbury, 8 p.m.

THURSDAY, MARCH 15

I.E.E. (London Utilisation Section).—"Transients in Electric Mine Winders and their Effects on Rope Stresses." T. H. Petch. Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (N. Midland Centre, Discussion Circle).—"Organisation of Laboratory Work." E. C. Walton. Lighting Service Bureau, 24 Aire St., Leeds, 6 p.m.

I.E.E. (Irish Branch).—"Electricity Supply in the U.S.A." W. R. Roe and R. L. S. McDowell. Trinity College, Dublin, 6 p.m.

I.E.S. (Glasgow Centre).—Annual meeting. Presidential address by L. J. Davies. Followed by annual dinner.

I.E.S. (Gloucester and Cheltenham Centre).—"Hospital Lighting." D. J. Reed. Cadena Cafe, High St., Cheltenham, 6.30 p.m.

I.E.S. (Bradford Group).—"Fluorescent Lamps—Facts and Faults." T. C. Holdsworth. Y.E.B., 45 Sunbridge Rd., 7.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Birmingham Branch).—"Refrigeration and Air Conditioning." F. L. Pettman. Imperial Hotel, 6.30 p.m.

ELECT. POWER ENGRS.' ASSOC.—"Modern Street Lighting." P. Hartill. Northampton Coll. of Technology, St. George's Ave., 7 p.m.

FRIDAY, MARCH 16

I.E.E. (Scottish Centre).—Annual dinner and visit of President. North British Station Hotel, Edinburgh.

BRIGHOUSE ENGRNG. SOC.—"Electricity, Wonderful Thing." Mr. Ashton of Y.E.B. Blakeborough's Club, 7.30 p.m.

MANCHESTER ASSOC. OF ENGRS.—Annual meeting. "Design in Relation to Manufacture." C. A. Sparkes. Engineers' Club, Albert Sq., 6.45 p.m.

It's got to be TOUGH!

Cables for underground, coal cutting, drilling and conveying have got to be tough. HENLEY TRAILING CABLES are tough enough for the job. We shall be pleased to assist you in selecting types most suitable for your particular class of work.

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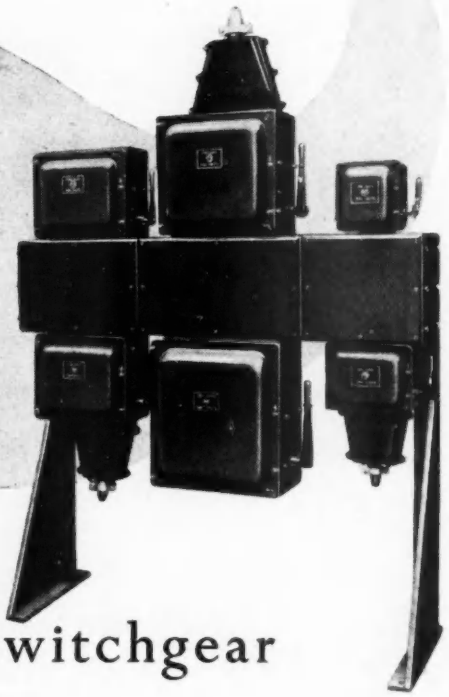

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Complete switchboards for medium voltage power and industrial systems can be built up from Metrovick Standard MC Units. No drilling is required on site and boards can be extended as required. Metrovick gear may be run continuously at its nominal maximum rating and is built to provide a long trouble-free working life. Write for full details.

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F/V003

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

METROPOLITAN BOROUGH OF WANDSWORTH

ELECTRIC CABLE

TENDERS are invited for the supply and delivery to Tooting Depot, Greaves Place, Tooting, S.W.17, of 10,800 ft (lin.) of 3.029 S.W.G. armoured cable in various lengths of 2, 3, 4, 8 and 12-core cable.

Specifications, schedule and other tender documents, which can be obtained by application to the Borough Engineer, Surveyor and Architect at the under-mentioned address, must be delivered to the undersigned not later than 12 noon on Wednesday, April 4, 1951.

The Council does not bind itself to accept the lowest or any tender.

R. H. JERMAN,
Town Clerk.

Municipal Buildings, Wandsworth, S.W.18.
March, 1951. (K 102)

EGYPTIAN GOVERNMENT

TENDERS are called for by the Director General, Cairo Electricity and Gas Administration, for the supply and delivery into stores, Cairo, of v.i.r. cables, 250 and 660 V, for wiring of buildings.

Tenders should be submitted to the Director General, Cairo Electricity and Gas Administration, 53 Fouad El Awal Street, Cairo, Egypt, not later than noon on March 26, 1951.

Copies of the necessary conditions of tender, specification, etc., can be obtained on application to the Chief Inspecting Engineer, Egyptian Government, 41 Tothill Street, London S.W.1, against remittance of £2 1s. per set, which sum must be pre-paid and is not returnable. Copies of these documents are also available for scrutiny at the above address. Cheques must be endorsed permitting transfer to an Egyptian Government account.

Reference No. 35/Elect. and Gas, 3/2/18, must be quoted in all correspondence. (K 82)

SITTINGBOURNE AND MILTON URBAN DISTRICT COUNCIL

STREET LIGHTING INSTALLATION

TENDERS are invited from qualified contractors for the supply, erection, installation and complete execution of the following street-lighting schemes:—

(a) Class "A" lighting to the Trunk Road No. 34 (A.2) within the Urban District comprising 98 No. 400 W mercury vapour discharge lamps on concrete columns.

(b) Class "A" and "B" lighting on other main traffic routes on the Council's Housing Estates comprising 42 No. 250 W mercury vapour discharge lamps (25 ft mounting height) and 31 No. 80 W mercury vapour discharge lamps (15 ft mounting height).

Forms of tender, general conditions of contract, specifications and bills of quantities can be obtained from the Engineer and Surveyor, High Street Sittingbourne, on receipt of deposits of three guineas in respect of Scheme (a) "Trunk Road" and two guineas in respect of Scheme (b). These deposits will be refunded upon receipt of a bona-fide tender not subsequently withdrawn. Drawings and other particulars may be inspected at the office of the Engineer and Surveyor during normal working hours.

Tenders in sealed envelopes endorsed "Street Lighting" and bearing no indication of the sender are to be delivered to the undersigned by not later than 10 a.m. on Friday, March 16, 1951.

The Council do not bind themselves to accept the lowest or any tender for either contract.

D. ALLEN,
Clerk of the Council.

Council Offices,
High Street, Sittingbourne.
February 23, 1951. (K 121)

CITY OF BELFAST

RE-PLATING OF LEAD-ACID STORAGE BATTERY

TENDERS are invited for the re-plating of Lead-Acid Storage Battery.

Form of tender and specification (No. G.160) may be obtained at the Electricity Department, East Bridge Street, Belfast, on payment of a deposit of one guinea (cheques to be made payable to the Belfast Corporation Electricity Department), which deposit will be refunded, provided a bona-fide tender be lodged and not withdrawn. Extra copies may be obtained at half a guinea each, which sum will not be returnable.

Each tender, in sealed envelope marked "Tender for Re-plating Battery, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, March 30, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP
Town Clerk.

City Hall, Belfast.
March 1, 1951. (K 103)

APPOINTMENTS VACANT

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the positions of FIRST ASSISTANTS to the District Commercial Managers in District 222 (Neath) and District 223 (Swansea) in the West Central Sub-Area of the Board.

Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering or its equivalent and who have had experience in the commercial operations of a district.

The salary for the positions will be in accordance with the National Joint Board Schedule for the electricity supply industry as shown hereunder:—

1. District 222, Class "E", Grade 5, £662-£678-£694.
2. District 223, Class "F", Grade 5, £711-£724-£737.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than March 17, 1951.

D. G. DODDS,
Secretary.
(K 113)

BRITISH ELECTRICITY AUTHORITY

South Western Division

APPLICATIONS are invited for the appointment of a FITTER in the Technical Department, Bristol.

Candidates should have completed a works apprenticeship and be experienced in assembling and constructing protective relays and all types of electrical instruments. Candidates should also be capable of adjusting and rewinding defective relays and relay coils. A knowledge of relay calibration and testing would be considered an advantage.

General conditions of employment will be in accordance with the N.J.I.C. Agreement, the present wage rate being 3s. 0½d. per hour.

Applications, stating age, full details of qualifications and experience, should be sent to the Divisional Secretary, British Electricity Authority, South Western Division, 26 Oakfield Road, Clifton, Bristol 8, so as to be received not later than March 17, 1951.

R. C. BARRETT,
Divisional Secretary.
March 2, 1951. (K 112)

CITY OF BULAWAYO, SOUTHERN RHODESIA

VACANCY: GENERATION ENGINEER

GROSS EMOLUMENT: £1,225 RISING TO £1,395, PLUS CHILDREN'S ALLOWANCES

APPLICATIONS are invited from Chartered Engineers, preferably Corporate Members of the Institution of Mechanical Engineers, for the above vacancy, which involves responsibility to the City Electrical Engineer for the efficient maintenance and operation of the Council's two Power Stations with plant of 88.5 MW combined capacity including installations on order and under erection, the major portion of which operates at 635 p.s.i. and 850 deg. total temperature.

Applicants should, apart from possessing the above minimum qualifications, have had satisfactory training and experience in modern power station practice.

The commencing gross emolument will be £1,225 5s. rising by four annual increments to £1,394 13s. plus children's allowances. This is based on a salary scale of £1,108 16s. by £43 4s. to £1,281 12s. plus a variable cost of living allowance at present fixed at a rate of £92 9s. at the commencement of the grade and £89 1s. at the top of the grade, plus a stand-by allowance of £2 a month. Children's allowances of £30 per annum for the first child and £24 per annum for each of the next two children will also be payable.

In Southern Rhodesia the income tax payable by the successful applicant, if married and with two children, is at present approximately £10 per annum on a total initial emolument of £1,279 per annum.

A house will be available on the power station site at a rental of £8 a month, but the successful applicant may make private arrangements for accommodation should he so desire. The successful applicant, after a satisfactory probationary period of twelve months, will, if under the age of 45 years, be required to join the pension fund, on obtaining a satisfactory certificate from the Council's medical officer of health.

Applications, giving full personal and professional details, and accompanied by one unmounted photograph, should be sent by airmail so as to reach the undersigned by not later than noon on Friday March 16, 1951.

H. J. COOK,
Town Clerk.
(H 708)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment: STATION CLERK, Norwich Generating Station.

The salary will be in accordance with Grade 4 of the National Joint Council Salary Agreement, i.e. £510 by £20 to £570 per annum.

Applicants should have had wide experience in accounting work and administrative and clerical duties in a generating station and possession of an examination certificate, e.g. Institute of Cost and Works Accounts, will be an advantage; any event, experience in the preparation and payment of wages, certification of invoices, stores accounting and costing, is essential.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience, qualifications and present position, should be forwarded in envelopes marked "Station Clerk—Norwich" to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than March 16, 1951.

W. N. C. CLINCH,
Controller.
Northmet House, Southgate, N.14. (K 117)

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

APPLICATIONS are invited for the position of CHARGE ENGINEER (shift) Class "F", Grade 7, at Bonnybridge Power Station, commencing salary £625 per annum.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, and the appointment will be superannuable under the terms and conditions of the authority's superannuation scheme.

Candidates should preferably have experience of steam electric power plant, including detailed working knowledge of the operation of steam turbo-generators, modern boiler plant, and of high tension electrical switchgear. Educational qualifications should be equivalent to Higher National Certificate standard. Certificated engineers with extensive marine experience would also be considered.

Applications, stating age and experience, should be forwarded to the Divisional Controller, British Electricity Authority, British Electricity House, High Street, Portobello, Midlothian, not later than Saturday, March 17, 1951.

J. F. FIELD,
Divisional Controller.
February 27, 1951. (K 110)

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT COMMERCIAL ENGINEER

The re-organised Tunbridge Wells District (this incorporates the former districts of Tonbridge and East Grinstead and part Weald, approximately 200 sq. miles and 34,000 consumers).

SALARY of £722, rising to £752 p.a. under the N.J.B. Schedule, Class "E", Grade 4. Superannuation will be arranged. Applicants to be qualified engineers with experience in a large district commercial department, conversant with tariffs, showrooms, sales, commercial statistics, installation work and all aspects of service to domestic, commercial and agricultural consumers. The person appointed will be responsible for the department. Accommodation may be available for the successful applicant.

Applications, giving two referees, must reach T. W. Dann, M.Eng., M.I.E.E., Tunbridge Wells Manager, South Eastern Electricity Board, Town Hall, Tunbridge Wells, by March 19, 1951.

FIRST ASSISTANT DISTRICT ENGINEER
(Kingston and District)

Salary of £711 p.a., plus London Weighting under N.J.B. Schedule, Class "F", Grade 5. Superannuation will be arranged. Applicants must be suitably qualified and preferably Corporate Members of the I.E.E., with a sound general and technical education. Experience should include the design, construction, maintenance and operation of 3-phase and single-phase, 33 kV, 11 kV and 3.3 kV and low tension distribution underground systems, together with indoor and outdoor type sub-stations. Knowledge of the installation, commissioning and routine maintenance of protective equipment is desirable. The district covers Kingston, Surbiton, Esher and Dittons, Walton and Weybridge.

Applications, on forms obtainable from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, South Eastern Electricity Board, Rough Rew, Horsham Road, Dorking, Surrey, to be returned by March 21, 1951.

A. L. BURNELL,
Secretary.
March, 1951. (K 115)

BRITISH ELECTRICITY AUTHORITY

South Western Division

SECOND ASSISTANT ENGINEER (ELECTRICAL)
GENERATION CONSTRUCTION DEPARTMENT

APPLICATIONS are invited from suitably qualified candidates for appointment as Second Assistant Engineer (Electrical) in the Generation Construction Department, Bristol.

Applicants should have had appropriate technical and works training, and should be familiar with modern practice in respect of transformers, motors, switch and control gear. Experience in the design, specification and layout of power station electrical equipment would be considered an advantage.

The general conditions of employment will be those negotiated by the National Joint Board and the salary in accordance with Schedule "C". Class "AX/CX" Grade 2, i.e. £752-884/920-£938 p.a.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Clifton, Bristol 8, and should be returned to him not later than March 22, 1951.

R. C. BARRETT,
Divisional Secretary.
March 2, 1951. (K 111)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SHIFT CHARGE ENGINEER—NORTH WILFORD

APPLICATIONS are invited for the position of Shift Charge Engineer at North Wilford Generating Station, Nottingham. Applicants should have a sound technical training and practical experience in the operation and control of modern steam generating plant and switchgear. Preference will be given to candidates having pulverised fuel experience and who have the Higher National Certificate or equivalent qualifications.

The salary for this position will be in accordance with Class "K," Grade 7, of the National Joint Board Agreement. The post will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, and returned not later than March 14, 1951.

W. S. BURGE,
Divisional Controller.
British Electricity House,
Barker Gate, Nottingham. (K 29)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the following positions:—

No. 386. YOUTH TRAINING ASSISTANT in the Welfare and Training Section at Divisional Headquarters, to assist in the administration of Youth Training Schemes for all grades of apprentices and junior clerical staff.

Candidates must have had a general workshop training and experience of modern methods of youth education. Experience of interviewing and general administration work is desirable

The salary range will be £510 to £570 per annum, in accordance with Grade 4 of the National Joint Council Salary Agreement.

No. 387. WORKSHOP TRAINING INSTRUCTOR at Stuart Street Generating Station, Bradford, Manchester.

The duties will include the supervision and instruction of apprentices and other trainees in basic workshop practice, and the necessary demonstrating, lecturing and general clerical work in connection with the Training Workshop.

Candidates must have served a recognised workshop apprenticeship and have had experience of instructing in the use of hand and machine tools, methods of heat treatment, elementary electrical practice, etc.

The salary range will be £450 to £510 per annum, in accordance with Grade 3 of the National Joint Council Salary Agreement.

No. 388. STATION SHIFT CONTROL ENGINEER at Radcliffe Generating Station, Ringley Road, Radcliffe.

Salary range £510 to £530 per annum, in accordance with Grade 10, Class "F."

No. 389. SHIFT CHARGE ENGINEER at Wigan Generating Station, Bradford Place, Wigan.

Salary range £563 to £573 per annum, in accordance with Grade 7, Class "D."

No. 390. STATION SHIFT CONTROL ENGINEER at Wigan Generating Station.

Salary range £465 to £481 per annum, in accordance with Grade 10, Class "D."

No. 391. ASSISTANT SHIFT CHARGE ENGINEER at Hartshead Generating Station, Stalybridge.

Salary range £571 to £597 per annum, in accordance with Grade 9, Class "G."

Candidates for vacancies 388 to 391 should preferably possess technical qualifications, and previous experience in a generating station is desirable.

All the above posts are superannuable, and except where stated otherwise, the salaries are in accordance with the Revised National Joint Board Agreement.

Applications, quoting vacancy number, stating age, qualifications, present position, and giving full details of education and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than March 19, 1951. (K 98)

BRITISH ELECTRICITY AUTHORITY

North Eastern Division

NORTH TEES "A", "B" AND "C" POWER STATIONS

APPLICATIONS are invited for the following appointments, which will be made during the present year at North Tees "A", "B" and "C" Power Stations, Billingham-on-Tees.

1. North Tees "A", "B" and "C" Power Stations (capacity when complete 350 MWs):

(a) POWER STATION SUPERINTENDENT. Grade 1, Class "K" (£1,310-£1,372).
(b) DEPUTY POWER STATION SUPERINTENDENT. Grade 3, Class "K" (£1,092-£1,142).
(c) ASSISTANT POWER STATION SUPERINTENDENT. Grade 5, Class "K" (£917-£959).
(d) ASSISTANT ENGINEER (Coal and Ash Handling). Grade 9, Class "K" (£687-£715).

Applicants for appointments (a), (b) and (c) above should have had wide experience in the operation, maintenance and administration of a Power Station.

2. North Tees "C" Power Station (capacity when complete 240 MWs).

(a) OPERATING AND EFFICIENCY ENGINEER. Grade 5, Class "J" (£857-£897).
(b) MAINTENANCE ENGINEER (Mechanical). Grade 6, Class "J" (£799-£833).
(c) 5 SHIFT CHARGE ENGINEERS. Grade 7, Class "J" (£736-£770).

Applicants should have had previous experience in a large Power Station.

3. North Tees "A", and "B" Power Stations (capacity 110 MWs).

Applications are also invited for vacancies which may arise at the existing North Tees "A" and "B" Stations as follows:—

(a) OPERATING AND EFFICIENCY ENGINEERS. Grade 5, Class "G" (£749-£783).
(b) SHIFT CHARGE ENGINEERS. Grade 7, Class "G" (£651-£679).

(*Continued in next column*)

(*Continued from previous column*)

The salaries mentioned in respect of grades not named in the National Joint Board Agreement are to be regarded as provisional and subject to negotiation through the appropriate machinery.

The Local Authority's housing programme takes into account the commissioning of new industrial works in the area and the successful applicants would receive consideration for the tenancy of council houses allocated to these works.

Forms of application may be obtained from the Divisional Secretary (Establishments), British Electricity Authority, North Eastern Division, Carliol House, Newcastle-upon-Tyne 1, to whom they should be returned, to arrive not later than March 31, 1951. (K 122)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment: STORES SUPERVISOR, Cliff Quay Generating Station.

The salary will be in accordance with Grade 3 of the N.J.C. Salary Agreement, i.e. £450 by £20 to £510 per annum.

The person appointed will be required to carry out such administrative and clerical duties as may be assigned to him by the Station Superintendent. Experience in the classification of stores and spares, purchase, ordering and the maintenance of stocks, stock-taking and stores records is essential.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience and present position, should be sent in envelopes endorsed "Stores Supervisor—Cliff Quay" to arrive not later than March 16, 1951, to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14.

W. N. C. CLINCH,
Controller.

Northmet House, Southgate, N.14. (K 116)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of THIRD ASSISTANT ENGINEER (Statistics) in the Generation Operation Department at Divisional Headquarters, Birmingham. Salary will be in the range of Schedule "C" Grade 5 of the National Joint Board Agreement, £579 to £710 per annum, according to qualifications and experience.

Candidates should possess Higher National Certificate in Electrical and/or Mechanical Engineering, or an equivalent qualification, and have had experience in the operation and maintenance of power station plant.

Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than March 24, 1951.

F. W. LAWTON,
Divisional Controller.
(K 96)

COUNTY BOROUGH OF DERBY

Borough Engineer and Surveyor's Department

APPOINTMENT OF
STREET LIGHTING SUPERINTENDENT

APPLICATIONS are invited for the appointment of a Street Lighting Superintendent at a salary in accordance with Grade VI of the National Charter (£595 to £660 per annum).

Street lighting in Derby is by electricity only, and it is essential that candidates should have had experience in towns similarly controlled. Preference will be given to those candidates who are Associate Members of the Institution of Electrical Engineers and Members of the Public Lighting Engineers Association.

The appointment will be terminable by one month's notice on either side, and is subject to the provisions of the Local Government Superannuation Act 1937. The successful candidate will be required to pass a medical examination satisfactory to the Corporation.

Details of appointment may be obtained upon application to Mr. M. L. Francis, Borough Engineer and Surveyor, The Council House, Corporation Street, Derby, to whom applications must be sent endorsed "Street Lighting Superintendent," not later than Monday, March 19, 1951.

The Council is not in a position to provide or assist in the provision of housing accommodation for the successful candidate.

Canvassing directly or indirectly will be a disqualification, and candidates should state whether they are related to any member or senior official of the Council.

E. H. NICHOLS,
Town Clerk.

The Council House,
Derby.
March, 1951. (K 128)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

Area Board Headquarters

SECOND ASSISTANT ENGINEER, Distribution Design (Substations), Chief Engineer's Department (Vacancy No. 19.51)

Duties will include the design of substations operating at voltages of 33 kV and above; preparation of schedules and specifications, and ordering of substation plant and equipment, including negotiations with manufacturers and inspection of equipment in course of manufacture; design of protective gear installations for the primary high-voltage systems.

Applicants should have had considerable experience of the above duties preferably in a large supply undertaking. Specialist knowledge of h.v. switchgear, large h.v. transformers or protective gear will be an advantage. Applicants should possess a degree in electrical engineering and be corporate members of the Institution of Electrical Engineers. Salary: N.J.B. Schedule "C" "AX-DX." Commencing salary £752 £884, rising to £966 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Leeds, within fourteen days of the appearance of this advertisement.

No. 5 (Wakefield) Sub-Area

THIRD ASSISTANT ENGINEER (Operation and Maintenance) (Vacancy No. 12/51)

Applicants must have had a sound practical training and considerable experience in the erection and maintenance of h.v. overhead lines and the maintenance of substation plant and ancillary equipment up to and including 66 kV. Preference will be given to applicants who are Corporate Members of the Institution of Electrical Engineers or who hold equivalent qualifications.

Salary: N.J.B. Schedule, Class "J," Grade 10, £609-£633 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, within fourteen days of the appearance of this advertisement. (K 84)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments at East Power Station, Newport, at salaries in accordance with the Revised National Joint Board Agreement:—

(a) ASSISTANT TO THE STATION SUPERINTENDENT Class "F," Grade 11 (£462 to £493 per annum).

(b) ASSISTANT MECHANICAL MAINTENANCE ENGINEER, Class "F," Grade 9 (£538 to £560 per annum).

Applicants for both appointments should preferably have obtained the Higher National Certificate or its equivalent and served a regular apprenticeship.

Applicants for (a) should have had previous experience in the keeping of operational and efficiency records; those for (b) should have had sound experience in the operation and maintenance of h.p. and i.p. boilers and turbines.

The appointments are superannuable in accordance with the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtained from the Divisional Secretary's office at the address below, to whom completed forms should be returned not later than March 21, 1951.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport, Cardiff.
February 28, 1951. (K 95)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following post: ASSISTANT ENGINEER (Construction), Bracknell District of No. 1 (Southall) Sub-Area.

Salary N.J.B., Class "E", Grade 10, Column 1 (£488 per annum). N.J.B. conditions of service.

Duties will include assisting the construction engineer in the district in the installation and erection of plant, equipment, overhead lines, the laying of mains and other constructional work by direct labour and/or by contract on urban and rural distribution systems up to and including 11 kv, including testing and commissioning.

The successful candidate for the above appointment will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 2-6 Windmill Lane, Southall, and returned to him not later than 14 days after the appearance of this notice.

F. W. KEMPTON,
Secretary.
(K 114)

GOVERNMENT OF IRAQ

CHIEF MECHANICAL AND ELECTRICAL ENGINEER required by the Directorate-General of Municipalities, Iraq, for one tour of 2½ years in first instance. Salary of not less than I.D. 140 a month, plus cost-of-living allowance of between I.D.10 and I.D.14 a month, according to dependants (I.D.1 = £1.) The post is non-pensionable, but there is a Provident Fund. Free passages. Candidates must be Corporate Members of the Institution of Mechanical Engineers and the Institution of Electrical Engineers, or possess one of these qualifications, and have a sound technical knowledge and suitable experience in both electrical and mechanical engineering. They must be capable of undertaking the design of a.c. and d.c. public lighting systems and be fully acquainted with the installation, maintenance and operation of diesel electric generating plants and electrically driven pumping units, and the layout and construction of h.t. and l.t. overhead lines. There is also a vacancy in the Directorate for a Mechanical and Electrical Engineer. Salary not less than I.D.150 a month, plus cost-of-living allowance. Other details as above. Candidates will be considered for either appointment.—Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents, 4 Millbank, London S.w.1, and quoting M.2754.B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (K 109)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the following positions as GENERAL ASSISTANT ENGINEERS in the Generation Construction Department at Divisional Headquarters, Mosley, Birmingham. The salaries for these positions will be in the range of Schedule "C," Grade 8 of the National Joint Board Agreement, £437 to £569 per annum, commencing at £437 per annum:—

(a) Candidates should be corporate members of the Institution of Electrical Engineers or at least possess Higher National Certificate in Electrical Engineering, and should have a knowledge of switchgear, electrical auxiliaries and multicore cable work. A sound workshop training or experience in testing will be considered an advantage.

(b) Candidates should hold Higher National Certificate in Mechanical Engineering, and should have had experience in either (i) the design and installation of mechanical equipment for power stations or industrial works or (ii) knowledge of boiler and turbine design in the Contracts Department of a large engineering works.

Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than March 24, 1951.

F. w. LAWTON,
Divisional Controller.
(K 97)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

DEPUTY POWER STATION SUPERINTENDENT—Brimsdown

Salary in accordance with the revised N.J.B. Agreement, Schedule "A," Grade 3, Class "J" (£1,016 to £1,066 per annum, plus London weighting).

Applicants should have had a good technical education, practical experience in the operation, maintenance and administration of a large generating station, and should preferably be Corporate members of one of the recognised Engineering Institutions.

The successful applicant will be expected to reside within a reasonable distance of the Generating Station.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than March 16, 1951. Envelopes should be endorsed "Deputy Power Station Superintendent—Brimsdown."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (K 118)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SHIFT CHARGE ENGINEER
NORTHAMPTON GENERATING STATION

APPLICATIONS are invited for the position of Shift Charge Engineer at Northampton Generating Station.

Applicants should have a sound knowledge of operation of modern steam generating plant, and be technically trained to Higher National Certificate standard or equivalent.

Conditions of service will be in accordance with the National Joint Board Agreement and the salary will be within Class "F", Grade 7 (£625-£643 per annum) of that agreement. Extension of plant, now in progress, will when commissioned, raise the station classification.

The appointment will be in accordance with the terms and conditions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, East Midlands Division, Barker Gate, Nottingham, and should be returned not later than March 20, 1951.

W. S. BURGE,
Divisional Controller.

February 28, 1951. (K 83)

APPLICATIONS are invited by the English Electric Co. Ltd. from YOUNG ENGINEERS of Graduate or Higher National Certificate standard in electrical engineering with completed recognised apprenticeship, for tendering and contracts department at the Company's various works handling turbines and other prime movers, electrical plant and apparatus. Selected applicants will, where necessary, be given a short course of preliminary instruction commencing early April and will receive full pay during training. The positions are permanent and progressive, and offer excellent opportunities in the field of commercial engineering.—Applications, quoting ref. 348B, to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (K 55)

APPLICATIONS are invited for a number of vacancies for ELECTRICAL ENGINEERING SENIOR DRAUGHTSMEN for the installation of electrical equipment in large civil and military aircraft. Some knowledge of electronic equipment is desirable and possession of O.N.C. or H.N.C. (Elect.) preferable. The vacancies are for Cricklewood and Radlett (Herts) drawing offices. Further vacancies exist at Cricklewood only for Junior Electrical Engineering Draughtsmen for detailing the above work. The positions offer excellent opportunities for advancement to keen men. Write, stating age and full details of experience and qualifications, to: Staff Officer, Handley Page Ltd., Cricklewood, London N.W.2. (H 686)

APPLICATIONS are invited for the position of DEMONSTRATOR in the Leominster District.

Applicants must have had a good general education, and the possession of a recognised diploma in Domestic Science and Electrical Housecraft will be an advantage. Candidates must be able to conduct lecture demonstrations both in the service centres and on consumers' premises, and to advise consumers on the selection and use of electrical apparatus.

Salary and conditions of service will be in accordance with the National Joint Council Grade 1 within the range £310 to £350 per annum with further progress to £390 dependent upon a certificate of capability. The successful applicant will be required to contribute to the Board's superannuation scheme, if eligible.

Applications, in writing, stating age, education, qualifications, details of training and subsequent experience, should be forwarded within fourteen days to: Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Dithe-ington, Shrewsbury. (K 119)

ASSISTANT ELECTRICAL MAINTENANCE SUPERVISOR required by large manufacturing organisation in outer Eastern London area. Applicants should be between the ages of 28 and 40 years, have first-class practical and theoretical experience of maintaining heavy duty a.c. and d.c. industrial electrical equipment and be accustomed to taking responsibility and controlling labour. This is an established post. Salary paid in accordance with experience and qualifications. Generous non-contributory pension scheme. Five-day working week.—Replies to be addressed to Box No. 4023, Electrical Times, reference T/EMS, stating age, qualifications and giving detailed account of education and experience. (K 66)

CANADA
ONTARIO

Large electrical company requires EXPERIENCED CIVIL, ELECTRICAL and MECHANICAL ENGINEERS, DRAUGHTSMEN and TECHNICIANS. Excellent opportunities. Call, or write, stating experience:

Dept. B., Ontario Immigration, Ontario House, Charles II St., London S.W.1. (H 418p)

ASSISTANT STOREKEEPER required for electrical contractors, Westminster district.—Write, Box No. 4039, Electrical Times. (K 101)

ASSISTANTS required for Test Bed of Electrical Engineering firm in North West Kent. Applicants should have knowledge of a.c./d.c. motors and allied apparatus. State age, experience, and wage required.—Box No. 3089, Electrical Times. (C 688)

ASSISTANT OUTSIDE MANAGER required by the Brush Electrical Engineering Co. Ltd. Applicants should have sound turbine and electrical erection experience together with good knowledge of contract work. Must be capable of making decisions on technical and administrative matters.—Reply, giving details of education, career and salary required, to: Manager, Outside Erection Department, Loughborough. (K 75)

COMPETENT MECHANICAL AND/OR ELECTRICAL ENGINEERING DRAUGHTSMEN required for design work in connection with a cyclotron being constructed for cancer research. Salary in accordance with age and experience.—Apply in writing, giving full details of qualifications and previous appointments and including references, to the Senior Cyclotron Engineer, M.R.C. Cyclotron Section, P.O.W. Camp, Scrubs Lane, London W.12, quoting reference E.T. (K 80)

DISTRIBUTION CONTROLLERS. The Steel Company of Wales Ltd. invites applications for the posts of Distribution Controllers. Candidates must have a sound technical training and be conversant with switchboard operations on large e.h.t. systems.—Applications giving qualifications and experience should be addressed to The Personnel Superintendent, The Steel Company of Wales Ltd., Box No. 9, Port Talbot. (K 77)

ELECTRICAL DRAUGHTSMEN, one senior, one junior, required, West Midlands. Experienced low tension control gear layouts and diagrams. Senior man must have knowledge heavy plant layout. Compulsory pension scheme. Canteen facilities. State age, if married present salary and give references.—Box No. 4041, Electrical Times. (K 120)

ELECTRICAL ENGINEERS are required for the High Voltage Section of the Nelson Research Laboratories of the English Electric Co. Ltd., Stafford. Applicants should possess a degree in electrical engineering and have a sound knowledge and experience of H.V. problems and heavy electrical equipment.—Write, giving full details, quoting ref. 229C, to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (K 27)

ELECTRICAL ENGINEER, Graduate I.E.E. or equivalent standard, aged 25 to 30, with some D.O. and industrial experience required for progressive position in Electrical Design Department, London company. Work will comprise layout of wiring and control gear of small automatic machines and design of auxiliary equipment. —Write, full particulars, Box 7886, c/o White's Ltd., 72 Fleet Street, E.C.4. (K 92)

ELECTRICIANS required for maintenance work in North West Chemical Factory. Experience of all types of a.c. motors, switchgear and wiring. Preferably with some experience of starter and motor repairs. Must be prepared to work shifts, if necessary.—Applications in first instance to Box No. 4033, Electrical Times. (K 89)

ESTIMATOR required for lattice steel tower and wood pole lines, all voltages. Please state education, experience and salary required.—Enfield Cables Ltd., D.D.C. Dept., 81 Mitchell Street, Glasgow C.1. (K 90)

EXPERIENCED ENGINEERS, accustomed to the erection of lattice tower, concrete and wood pole overhead transmission lines, and willing to serve at home or overseas, age 25/45. Good prospects and pension.—Apply in writing, giving full details to Staff Officer, British Insulated Callender's Construction Company Limited, 21, Bloomsbury Street, London W.C.1. (K 124)

EXPERIENCED TIME STUDY ENGINEER, Bedaux trained, capable of dealing with labour and staff, required to head application in light engineering machine and assembly shops. Knowledge of press, sheet metal work and electrical appliances an advantage. Good salary commensurate with experience, pension scheme and opportunity for advancement in well established concern employing 3,000. Full details of qualifications and present and past employment will be treated in confidence. —Box No. 4027, Electrical Times. (K 72)

FERRANTI LIMITED invite applications for SENIOR APPOINTMENTS of graduate engineers with industrial experience in the design of electricity meters. The posts to be filled carry senior responsibility with excellent prospects, generous salary and pension.—Application forms from the Staff Manager, Ferranti Limited, Hollinwood. Please quote Reference M.E. (H 603)

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FOREMAN required by the Southern Electricity Board, Meter Repair Department, No. 1 (Southall) Sub-Area, Waterloo Road, Uxbridge. Applicants should be capable of taking charge and supervising the work of a large meter repair department, and have had superior experience in the repair of all types of single and three-phase meters, in particular prepayment and two part tariff meters, maximum demand attachments, instruments and time switches. Some manufacturing experience would be an advantage. Rates of pay and conditions of service to be governed by the National Joint Industrial Council Agreement dated July 20, 1949.—Applications, stating full details of qualifications, experience, age, etc., should be addressed to the Sub-Area Engineer, Southern Electricity Board, No. 1 (Southall) Sub-Area, Waterloo Road, Uxbridge, Middlesex, not later than March 9, 1951. Short listed applicants will be interviewed on March 20, 1951, commencing at 10.30 a.m. (K 70)

LANCASHIRE DYNAMO AND CRYPTO, Trafford Park, have a vacancy for a SENIOR DRAUGHTSMAN capable of preparing own calculations. Five-day week. Pension scheme.—Applications, stating age, experience and salary required should be addressed to the Personnel Manager. (K 12)

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SENIOR ELECTRICAL ENGINEER required for duty in Middle East areas of large oil company. Honours degree and/or A.M.I.E.E. qualification with administrative experience and considerable practice in the layout, operation and maintenance of h.t. and l.t. systems from generation to end use. Desirable age limit 40. Salary (incremental) from £1,300 plus substantial allowances; free furnished quarters/messing or allowances in lieu. Biennial (paid) home leave. Married applicants must be prepared to serve singly for first two to three years. —Write in full, quoting No. 31, to Box 4024, c/o Charles Barker and Sons, Ltd., 31 Budge Row, E.C.4. (K 94)

SHORT-CIRCUIT TEST ENGINEERS are required for the Nelson Research Laboratories of the English Electric Co., Ltd., Stafford. Applicants should possess a degree in electrical engineering and have experience of the operation and maintenance of heavy electrical plant. Duties will include the testing of heavy switchgear, and applicants must be interested in development work.—Write, giving full details, quoting Ref. 296D, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (K 10)

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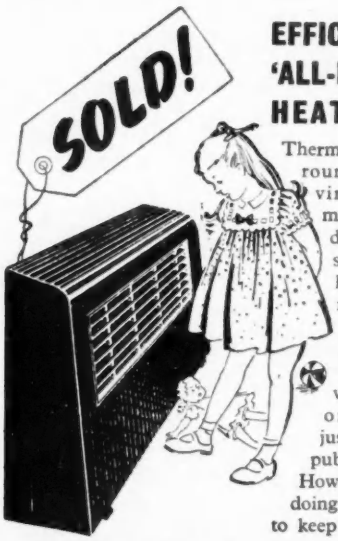

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140	960	Brush	Enc. Vent	Slip Ring
90	750	Brook	S. Protected	Slip Ring
75	740	Crom-Park	T.E.F.C.	Slip Ring
70	1,000	Brook	S. Protected	Slip Ring
67½	1,450	E.C.C.	Enc. Vent	Slip Ring
55	1,440	Brush	S. Protected	Slip Ring
50	750	Brook	Protected	Slip Ring
50	465	Brush	Protected	Squirrel Cage
45	730	B.T.H.	S. Protected	Slip Ring
45	920	Phoenix	Protected	Slip Ring
40	580	E.C.C.	Protected	Slip Ring
40	750	Brook	Protected	Slip Ring
40	1,000	Brook	S. Protected	Slip Ring
40	730	M. & P.	Enc. Vent	Squirrel Cage
35	715	Crom-Park	Protected	Slip Ring
32½	1,465	Crom-Park	T.E.F.C.	Squirrel Cage
32	1,500	Wright	Protected	Squirrel Cage
30	725	B.T.H.	Enc. Vent	Slip Ring
30	960	Crom-Park	S. Protected	Slip Ring
30	735	Crom-Park	S. Protected	Squirrel Cage
27	970	B.T.H.	T.E.F.C.	Squirrel Cage
27	960	Crom-Park	Pipe Vent	Squirrel Cage
25	580	Bruce-Peebles	T.E.F.C.	Slip Ring
25	580	Metro-Vick	Protected	Slip Ring
25	1,450	Higgs	S. Protected	Slip Ring
25	720	L.D.C.	Enc. Vent	H. Torque

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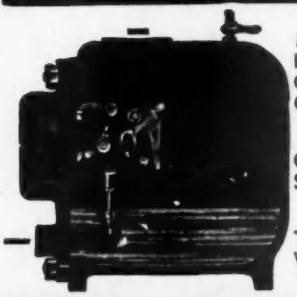

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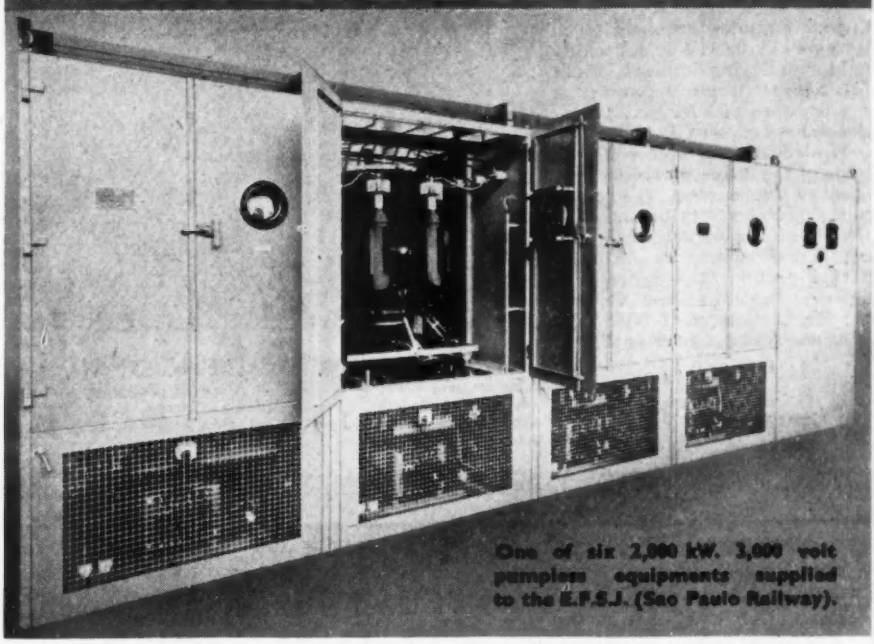

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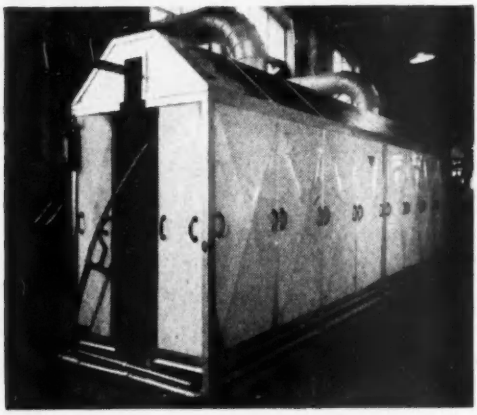

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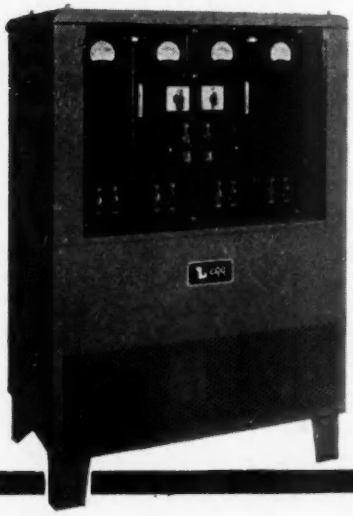

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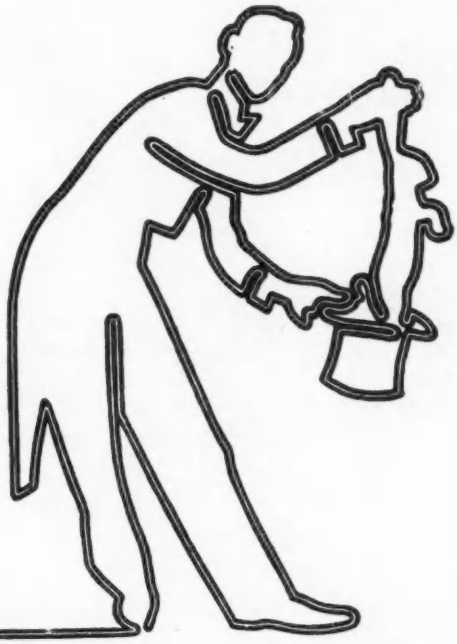

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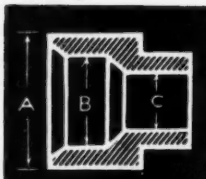

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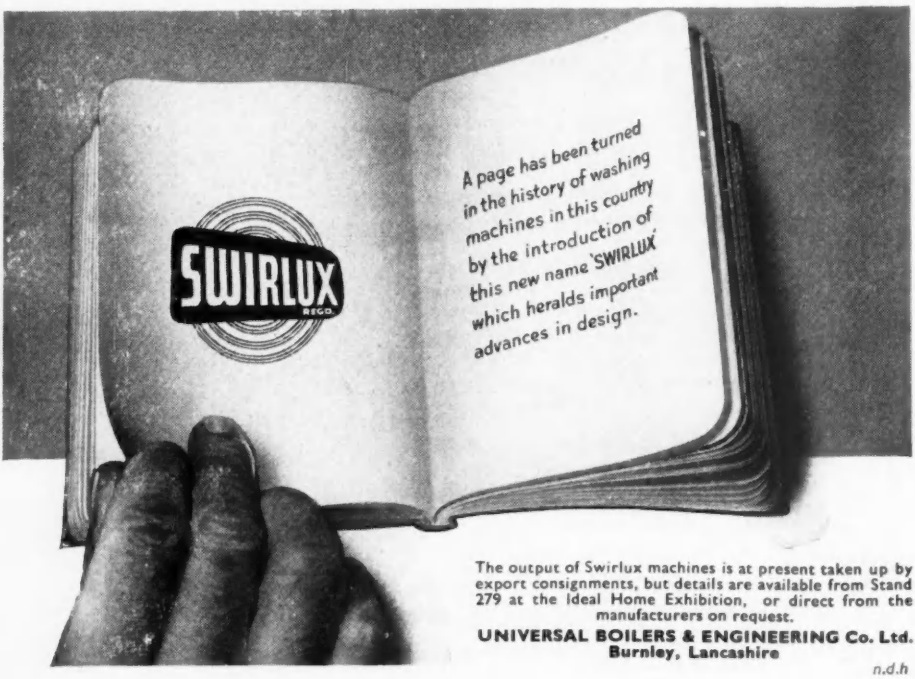
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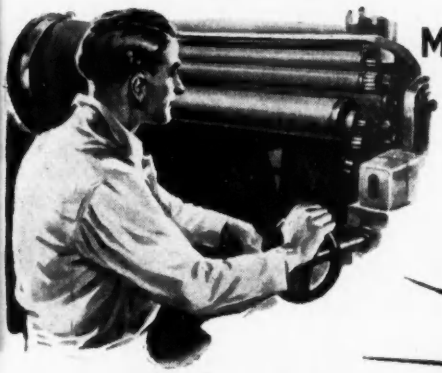

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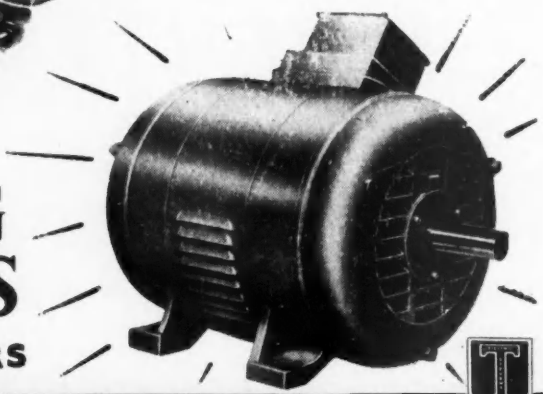

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...ading Dr. Melville Mackenzie, the British representative, expressed doubts about the wisdom of asking Governments for increased contributions. Such unrealistic action, he said might lead Governments to withdraw their support altogether.

...INDWARD AN... ...EEWARD IS.

The King has approved the appointment of Mr. Donald Edward Jackson, puisne judge of the Windward and Leeward Islands, to be Chief Justice of the Windward and Leeward Islands, in succession to Sir Clement Malone, who has recently retired.

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There was another atomic explosion to-day at the Atomic Energy Commission's testing ground in Nevada. Like the...

...Bundesrat to-...

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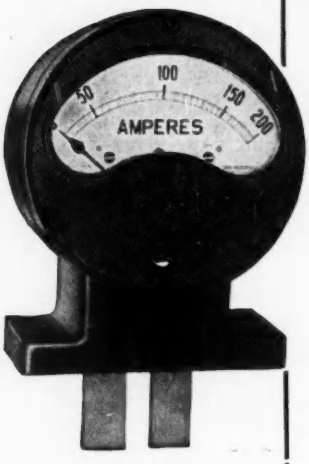

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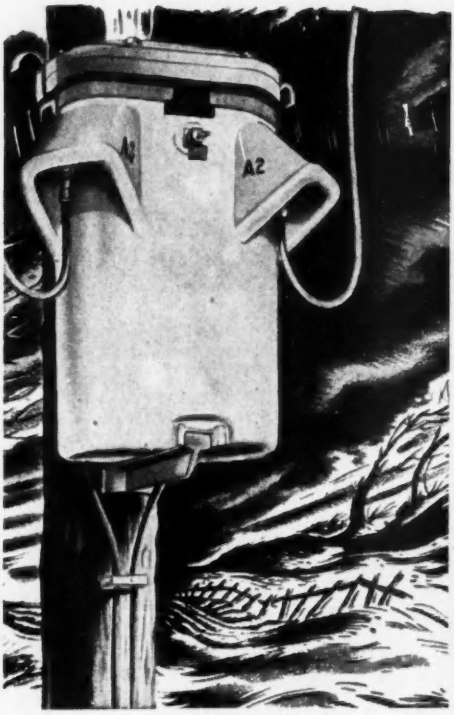

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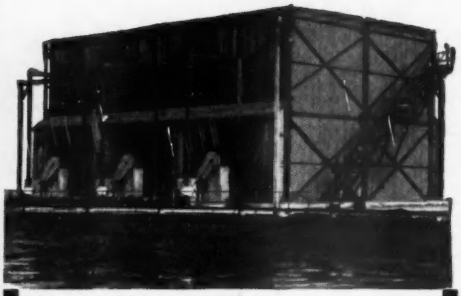

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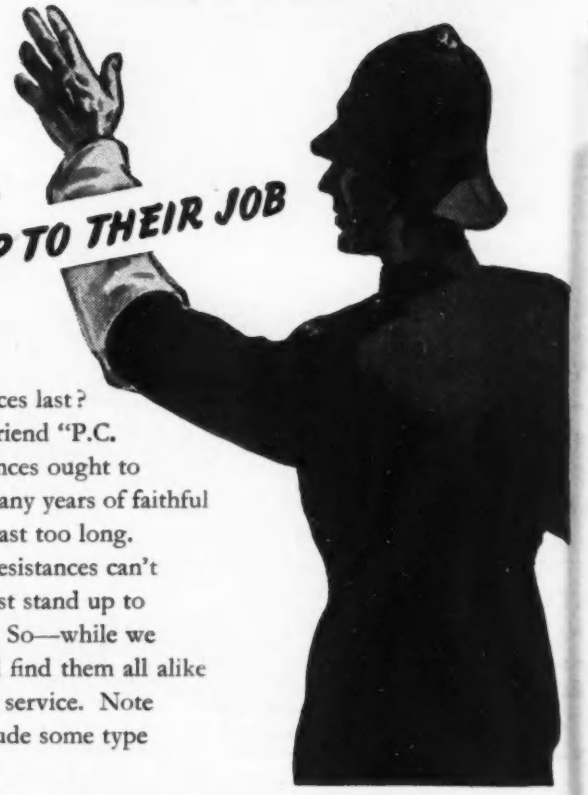

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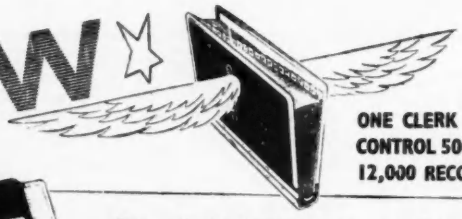

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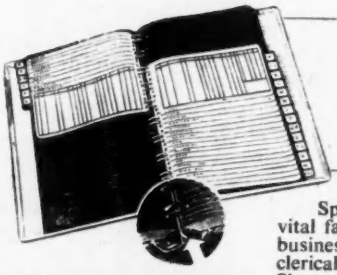

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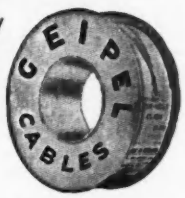

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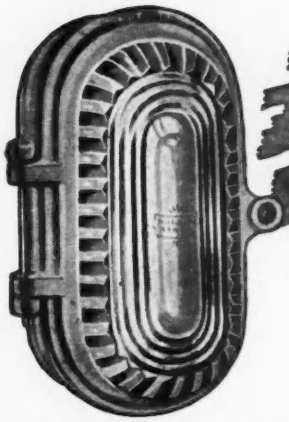

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